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Rice Today

International Rice Research Institute

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Changing the face of rice
Seeds for climate change
Bridging the GAP

Pillars of Agriculture

Women rice farmers labor to feed the world

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Vol. 10, No. 2

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On the cover:
A farmer from the Cordillera region in the Philippines carefully checks her newly harvested rice—the fruits of her labor. She is one of the many women who play a vital role in rice farming worldwide. Women provide 50–80% of the total labor input in rice production but culture and tradition have put them in the shadows, rendering their significant contributions unrecognized and, oftentimes, unappreciated. Campaigns to empower women, however, are gaining ground, giving them due recognition as pillars of agriculture; hence, of global food and economic security.

Rice Today is published by The Rice Trader Inc. (TRT) in association with the International Rice Research Institute (IRRI).

TRT, for 20 years, has brought subscribers crucial, up-to-the-minute information on rice trade through its weekly publication, *The Rice Trader.* Acknowledged as the only source of confidential information about the rice market, this weekly summary of market data analysis has helped both the leading commercial rice companies and regional government officials make informed decisions, which are critical in today's market.

IRRI is the world's leading international rice research and training center. Based in the Philippines and with offices in 13 other countries, IRRI is an autonomous, nonprofit institution focused on improving the well-being of present and future generations of rice farmers and consumers, particularly those with low incomes, while preserving natural resources. It is one of the 15 nonprofit international research centers supported, in part, by members of the Consultative Group on International Agricultural Research (CGIAR – www.cgiar.org) and a range of other funding agencies.

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Rice Today welcomes comments and suggestions from readers. *Rice Today* assumes no responsibility for loss of or damage to unsolicited submissions, which should be accompanied by sufficient return postage.

The opinions expressed by columnists in *Rice Today* do not necessarily reflect the views of TRT or IRRI.

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Rice Today is growing

Nine years ago, in April 2002, the first issue of *Rice Today* was published. Since then, the magazine has grown in distribution and reputation, carving out a niche as the world's only magazine dedicated to rice science through stories written for a general audience.

The International Rice Research Institute (IRRI) and The Rice Trader (TRT) have now been successfully producing the magazine together for two years. The partnership is going strong and is leading us into new territory as it takes advantage of the vast reach of the Worldwide Web and opens up to more advertising opportunities to help support the magazine and share information about private-sector products and services.

To further help *Rice Today* grow, this year, we will appoint an Editorial Board that will represent the different rice-growing regions of the world and the various facets of rice research and development embodied in the new Global Rice Science Partnership (GRiSP). We look forward to having a more diverse mix of people to share with us new ideas and keep us updated with the latest rice science innovations and stories that make a difference to rice farmers and consumers worldwide.

In line with our efforts to strengthen *Rice Today* and support its growth, we have made some changes in the current editorial team's structure. Duncan Macintosh, who had been the IRRI publisher of *Rice Today* since 2004, is concentrating his expertise on fund-raising and philanthropic investments for IRRI. Hence, I have now taken on the role of associate publisher to support Jeremy Zwinger—the publisher. We thank Duncan for his leadership with *Rice Today* and we look forward to his continued contributions in a different capacity. Mia Aureus (TRT) and Lanie Reyes (IRRI) continue in their editing roles, with Lanie now a full-time editor with extra responsibility to establish the Editorial Board, build our subscribers, and develop an e-*Rice Today*.

On that note, and with this issue, we are proud to launch the email version of *Rice Today*, extending our reach even further to more rice scientists, extension practitioners, farmers, traders, policymakers, and rice enthusiasts worldwide. You can sign up to get e-*Rice Today* now by emailing info_ricetoday@irri.org.

As of this writing, the world is celebrating International Women's Day (8 March 2011), a time to acknowledge and celebrate the contribution of all women globally. In this issue, we have some stories that highlight the role of women in rice farming and rice science.

In the article *The hand that rocks the thresher*, Dr. Thelma Paris, IRRI's socioeconomist and gender specialist, discusses the underappreciated role that women play in rice production and how we must pay special attention to supporting women in rice science and rice production.

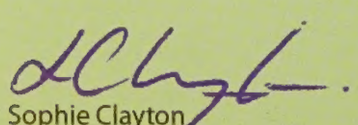
We also have a feature on the women in Africa who, apart from their domestic chores, are taking on larger roles in rice farming as more men in the household leave for the big cities in search of greener pastures.

Furthermore, in the state of Tamil Nadu in India, mechanization is reducing the backbreaking labor for women farmers who do most of the rice transplanting task. Farmers are rapidly adopting drum seeders and are learning different weed management practices to accompany the new technology.

We also have a great cast of women (and men!) involved in *Rice Today*. I am looking forward to working with the entire *Rice Today* team to build on this great publication.

If you haven't visited the *Rice Today* Web site recently, please do so. The current issue and all the back issues are available for free. The site is being upgraded and we hope to see continued improvements. We also need your feedback and ideas to help make it better. So, please check it out at www.irri.org/ricetoday and let us know what you think.

Finally, the *Rice Today* staff sends best wishes to the people of Japan as they continue to face a most difficult time in the wake of the 11 March 2011 earthquake and tsunami, and (as of this writing) contend with the threat of nuclear contamination. Japan is an important and highly valued partner in supporting and conducting rice research and our thoughts are with all our Japanese colleagues and friends at this time.



Sophie Clayton
Associate publisher
Rice Today

IRRI hosts farmers' field day

More than 650 farmers and government officials attended a field day at IRRI on 28 February 2011 to showcase the latest and best-performing IRRI rice varieties and technologies to help Filipino farmers produce more rice.

"One new IRRI-bred variety on display that was released in 2010 with the support of the Philippine Rice Research Institute and the Department of Agriculture (DA) is Tubigan 18 that is also called NSIC Rc222 or IRRI 154," said Dr. Robert Zeigler, IRRI director general.

"In national experimental trials, IRRI 154 yields up to 10 tons per hectare and, on average, 6 tons per hectare, or 12–13% more than the popular and widely used Philippine rice variety PSB Rc82—also bred by IRRI," he concluded.

IRRI 154 was developed for irrigated lowland areas but was also one of the best performers in rainfed areas, especially during the wet season, making it widely suitable across the Philippines. IRRI distributed seeds of IRRI 154 and two other recently released IRRI-bred high-yielding varieties among the farmers who attended.

The Philippine DA Secretary and IRRI Board Member Proceso J. Alcala also attended and expressed his support for helping Filipino farmers increase rice production to help the country become self-sufficient in rice. Farmers interviewed during the event shared the challenges they face in rice farming and indicated their need for new varieties.

ISAGANI SERRANO (3)

A new vision for agriculture

The World Economic Forum (WEF), together with a coalition of business entities, governments, and farmers, has launched a strategy to significantly increase food production while conserving environmental resources and spurring economic growth. The governments of Tanzania, Vietnam, and the U.S.; 17 global companies; international organizations; and agricultural leaders plan to accelerate sustainable agricultural growth through market-based solutions.

On 28 January 2011, during the WEF annual meeting in Davos, Switzerland, Robert Zeigler, director general of the International Rice Research Institute (IRRI), joined other leaders in the public and private sector (including Kofi Annan, U.N. secretary general, 1997-2006; Jakaya Kikwete, president of Tanzania; Doug McMillon, CEO, Walmart Stores; Jeff Raikes, CEO, Bill & Melinda Gates Foundation; Jeffrey Sachs, The Earth Institute; Rajiv Shah, administrator, U.S. Agency for International Development; and Robert Zoellick, president, The World Bank Group) in a dialogue on how to leverage public-private investment.

"We explored specific models and case studies of market-based multistakeholder collaboration that can help us achieve the goals of this new vision," said Dr. Zeigler. "This is just the beginning."

Provide food security for all . . .
. . . in an environmentally sustainable way
. . . While generating economic growth and opportunity

For more background, see the WEF's *Realizing a new vision for agriculture: a roadmap for stakeholders* at http://snipurl.com/ag_vision.

New rice beats cold

Australian scientists have developed a cold-tolerant rice variety, Sherpa, that can increase yields and improve water use in rice-growing areas that experience cold temperatures.

Rice production in Australia often suffers yield loss due to low overnight temperatures at the critical stage of pollen development. Farmers apply extra water to the rice to effectively keep the rice warmer and reduce yield losses.

Sherpa has a 2 °C improved tolerance of cold and should allow farmers to make more tactical water applications while increasing yields by 2–4 tons per hectare. The team developing Sherpa is working to increase tolerance to 7 °C, which could completely change the water management of rice farming in Australia.

Source: www.sciencealert.com.au

briefly

IRRI wins award

IRRI has won the 2010 BBVA Foundation Frontiers of Knowledge Award (Development Cooperation) for reducing global poverty and hunger through rice research and farmer training.

The award honors work that improves the quality of life in disadvantaged regions, fights poverty and marginalization, and preserves the natural environment.

The €400,000 (US$550,000) prize money will go toward IRRI's rice research and training work.

New rice for Nepal

Three new drought-tolerant rice varieties bred at IRRI have been released in Nepal.

The Sookha dhan varieties show a yield advantage of 0.8–1.0 ton per hectare over traditional varieties under severe drought. Drought is a particular problem for farmers in Nepal's rainfed areas, which cover 45% of the total rice production area.

Sookha dhan varieties were released in India as Sahbhagi dhan in 2009 and are expected to be released in Bangladesh soon.

IRRI goes to COP16

At the United Nations Climate Change Conference (COP16) held in Cancún, Mexico, in December 2010, IRRI and the United Nations Food and Agriculture Organization held a session to summarize the technological and economic viability of adaptation and mitigation projects in rice production, in view of the forthcoming post-2012 agreements.

As an outcome of an earlier workshop in June on the same topic, a policy brief will be synthesized from the proceedings to help policymakers and scientists understand and make "no regret" decisions to help rice producers reduce emissions and adapt to climate change. (See http://snipurl.com/climate_change_proc.)

G. VILLAMOR

RUEBEN SESSA (*right*), FAO environment officer, and Reiner Wassmann, IRRI senior scientist and coordinator of the Rice and Climate Change Consortium, led the discussion during the "Marketplace Session" in Cancún, Mexico, in December 2010.

Africa supports GRiSP

On 7-10 March 2011, the Africa Rice Center (AfricaRice) held its 31st board meeting in St. Louis, Senegal. One of the key highlights of the event was the board's official endorsement of AfricaRice's lead role as representative for the region in the Global Rice Science Partnership (GRiSP) that was launched last year. This mega-program aims to significantly contribute to the lowering of rice prices and to the reduction of global poverty by 10%.

"As one of the main architects of GRiSP, AfricaRice is committed to supporting its goal to develop Africa's potential to grow more rice," the board said.

Apart from the endorsement, the board also commended AfricaRice Director General Dr. Papa Abdoulaye Seck and the staff for their continued effort to push for the Center's growth and sustain its high level of performance since 2007. Taking note of AfricaRice's initiative to redirect the Center's vision and strategy based on scientific excellence and ownership by its member countries, the board expressed keen interest in AfricaRice's new research thrusts, including the development of new-generation climate-resilient rice technologies and innovative approaches, such as the market-oriented value chain approach being adopted by the Center. AfricaRice is also developing a new Strategic Plan that will be examined by the board in the coming months.

Awards and recognition

Robert Zeigler, IRRI director general, received a Doctor of Science (*honoris causa*) from Sardar Vallabh Bhai Patel University of Agriculture and Technology, Modipuram, Uttar Pradesh, India, on 23 February 2011. Dr. Zeigler was recognized for his outstanding contributions to rice research and help in improving the livelihood of millions of rice farmers in the developing world. He was also honored for providing excellent leadership for a global rice program benefiting millions of resource-poor rice growers worldwide.

Achim Dobermann, IRRI deputy director general for research, and **JoJo Lapitan,** IRRI national programs relations manager, were recognized at the 4th Rice Congress held on 2-3 December 2010 in Sri Lanka. Dr. Dobermann and Mr. Lapitan were cited for their contributions to the development of the country's rice sector.

Gurdev S. Khush, member of the U.S. National Academy of Sciences; adjunct professor, University of California, Davis; and former head of IRRI's Plant Breeding, Genetics, and Biotechnology (PBGB) Division, received a Doctor of Science (*honoris causa*) from Indira Gandhi Agricultural University on 20 January 2011. Dr. Khush played a key role in developing more than 300 rice varieties, including IR36, while he was at IRRI. His work helped avert famine and land degradation across Southeast Asia.

Rowena Oane, assistant scientist in PBGB, won first prize in the annual 2010 Outstanding Thesis in Biology and Allied Fields competition for her MS thesis *Transcription factor 'no apical meristem' (NAM): a candidate gene in the large-effect QTL for rice yield under reproductive-stage drought stress.* The award was given by the Philippine Council for Advanced Science and Technology Research and Development of the Department of Science and Technology.

Appointments

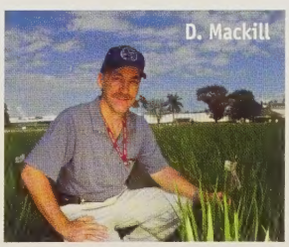
Jonathan Wadsworth has been appointed as executive secretary of the Fund Council and head of the CGIAR Fund. Dr. Wadsworth's top four priorities will be to (1) help the Fund Council provide good governance and management of donor funds; (2) offer the Fund Council chair sound advice and analysis for consensus decision making; (3) represent the Fund Council to CGIAR stakeholders; and (4) manage the Fund Office—the Fund Council's operational arm, particularly for resource mobilization—and coordinate its activities with those of the Consortium, donors, and others.

Keeping up with IRRI staff

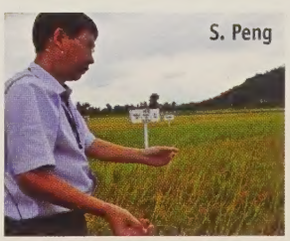
Rolando Torres was promoted to senior associate scientist in the Crop and Environmental Sciences Division (CESD). Other promotions in CESD were **Amelia Henry** (scientist) and **Tristram Batoto, Leo Angelo Ocampo,** and **Rowena Castillo** (assistant scientists). **Joselito Villa** and **Donald Villanueva** were promoted to associate scientist in PBGB and the Social Sciences Division (SSD), respectively.

Marian Hanna Nguyen joined as an associate scientist and **Arma Kristal Malijan** as a researcher in PBGB. **Tsung Wei Lai** came on board as an economist in the Grain Quality, Nutrition, and Postharvest Center. **Kamala Gurung** joined as a consultant and **Christian Genova II** as an associate scientist in SSD. **Samart Wanchana** is a new consultant in CESD.

Taznoore Samina Khanam joined the IRRI-Bangladesh Office as an assistant scientist under the project *Tracking Change in Rural Poverty in Household and Village Economies in South Asia*. **Ashok Sharma** joined the IRRI-India Office as a research associate for delivery and adoptive research at the Punjab Hub, while **Natarajan Kumaran** joined the IRRI-India Office as an extension agronomist at the Tamil Nadu Hub. Both are under the Cereal Systems Initiative for South Asia.



IRRI bids farewell to **David Mackill**, program leader for Stress-Tolerant Rice for Poor Farmers in Africa and South Asia and rainfed rice production, and to **Shaobing Peng**, senior crop physiologist in CESD.



Other departing staff members are **Helal Uddin Ahmed** and **Wei Zhou**, postdoctoral fellows; **Nikolaos Tsakirpaloglou**, visiting research fellow; and **Jing Tan**, consultant. **M. Rafiqul Islam,** senior research manager, and **Krishna Murari,** research associate, have also left the IRRI-Bangladesh Office and IRRI-India Office, respectively.

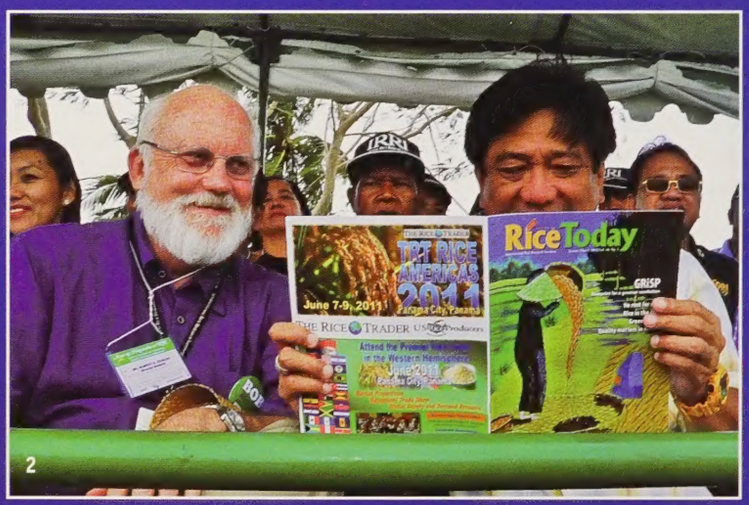
TRAINING COURSES AT IRRI

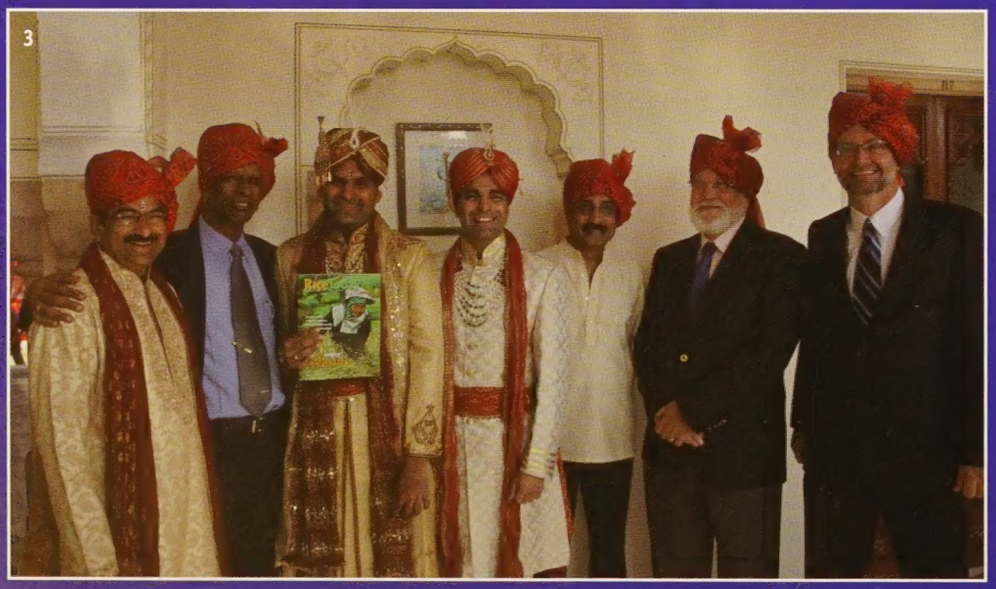
Course Title	Date
Rice: Research to Production	16 May-3 June
Basic Bioinformatics Course (BBC)	24-25 May
Rice Breeding Course	8-23 August
Molecular Breeding Course	3-14 October
Bioinformatics for Candidate Gene Discovery (BCGD)	18-20 October
Writing a Research Article for International Publications	28 November-2 December
Training Novice Authors to Write Scientific Articles for International Publications	5-7 December
Intercultural Thesis Supervision: Strategies for IRRI (and other centers)	8-9 December

For the complete list and information about the 2011 IRRI Training Courses, visit http://snipurl.com/training_courses.

For inquiries, email IRRITraining@cgiar.org, call (63-2) 580-5600 loc 2538/2824/2437, or send a fax to (63-2) 580-5699; 891-1292; 845-0606.

RiceToday around the world





1. **BENVENUTO! Mary Hensley (*left*), president of the Eighth Wonder company that markets heirloom rice in the U.S., and Rowena Sawil, a farmer and seed keeper from the Cordillera region of the Philippines, glowed with pride as they shared their cover story on *Rice Today* (Vol. 9, No. 4) at the Slow Food's Terra Madre Conference in Turin, Italy, last October 2010.**
2. **FARMERS' DAY. Proceso Alcala, agriculture secretary of the Philippines, and Dr. Robert Zeigler, IRRI director general, enjoy a good read of *Rice Today*, while spending a day with farmers at IRRI headquarters in Los Baños, Laguna, Philippines.**
3. **ALL IN THE FAMILY. Newly married sons of IRRI Principal Scientist J.K. Ladha (*far left*), Anuj (*third from left*) and Anupam (*fourth from left*), celebrate their double wedding in Orchha, India, with *Rice Today*. Among their honored guests from the IRRI family are Director General Robert Zeigler (*second from the right*), Deputy Director General for Research Achim Dobermann (*far right*), and former IRRI scientist V. Balasubramanian (*second from the left*).**

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Changing the face of RICE

by **Sushil Pandey**

IRRI develops a new vision for future rice farming to counteract threats to food security

ARIEL JAVELLANA

What does it take to attain global food security? This is a question for which rice provides part, if not most, of the answer. Rice—a staple food for the world's poor—is grown on more than 155 million hectares and accounts for one-fifth of the global calorie supply. In the past decade, changes such as rapid economic growth, especially in parts of Asia, rising wage rates, increasing diversification of diets, global climate change, and a greater integration of the food economy with other sectors of the global economy, including both energy and financial markets, have converged to shape the way rice is produced today and will be produced in the future.

Faced with more challenges in the years ahead, the world now needs a new vision for future rice farming to position investments in rice research, technology delivery, and designs for policy reforms strategically. Food security has risen in prominence on global leaders' agenda as the food crisis of 2008 rocked not just the market but also social stability, and, recently, there has been a rising concern that history will repeat itself.

Such a vision has been developed in a new book, *Rice in the Global Economy: Strategic Research and Policy Issues for Food Security*, published by IRRI in 2010 to commemorate its 50th anniversary. This edited volume, which consists of 18 chapters co-authored by 59 experts, was officially released in November 2010 during the International Rice Congress held in Hanoi, Vietnam. The book is forward-looking and various scholarly contributions lay out a rich menu of options for enhancing the overall performance of the global rice economy to reduce poverty and hunger.

As outlined in the book, five major challenges confront scientists and policymakers: meeting global food security needs by providing an affordable and stable supply of rice, managing structural change successfully, enhancing efficiency in input use and value chains, reducing environmental footprints, and improving productivity in the lagging regions such as Africa.

IRRI

Challenges to attaining sustainable food security

A major challenge is *sustaining the global rice supply* to meet rising consumption demand up until 2025 and beyond. Even if total consumption decreases somewhat beyond 2025 due to increasing dietary diversification, yield increases must be sustained to make up for the area lost to other crops as agriculture becomes more diversified and, most importantly, to cope with the negative impacts of climate change.

It is also equally important to manage price volatility for global and national food security—a

necessary strategy in the face of increasingly frequent and severe shocks caused by water scarcity, higher energy prices, and climate change.

Asian agriculture is poised to undergo major structural changes as nonagricultural sectors expand with economic growth. As labor moves out of agriculture in the course of economic growth, an immense challenge is *striking a balance* between consumer and producer interests and managing growing rural-urban income disparities.

ISAGANI SERRANO

As the world's resources become more limited, farmers must be able to *do more with less*, with fewer inputs in all aspects of rice farming and along the value chain. This means cutting costs, which is aided by greater efficiency in water, fertilizer, and pesticide use.

Improvements in input-use efficiency will help to *reduce the environmental footprints* of rice production. Beyond the plot level, the challenge will be to better manage rice-based ecosystems to reduce water pollution, soil erosion, and downstream silting, while saving land and biodiversity. Globally, rice systems can contribute strongly to the mitigation of global warming through reduced emissions of greenhouse gases, especially methane and nitrous oxide, as well as through increased sequestration of atmospheric carbon in soil organic matter.

For poverty reduction, it is paramount to help the lagging regions, especially in rainfed areas of both Asia and Africa, where rice productivity remains low and poverty is concentrated. These regions also face many challenges, including a lack of infrastructure, poor institutions and governance, and fragile soils. Many are also vulnerable to the effects of climate change.

Productivity growth in lagging regions must be attained while continuing to invest in raising productivity in irrigated areas that account for over 70% of total global rice production. We need to improve productivity and livelihoods in the lagging regions, especially in rainfed areas where some of the poorest people are concentrated.

Global solutions to future challenges

There is no single solution to the challenge of global food security. Instead, many options are available to sustainably improve rice systems and enhance the overall performance of the global rice economy to reduce poverty and hunger. Priorities will clearly differ greatly among countries and even within countries. They need to embrace a wide range of technological, policy, and institutional options. It is true that global problems need global solutions, but they must be flexible enough to meet local needs.

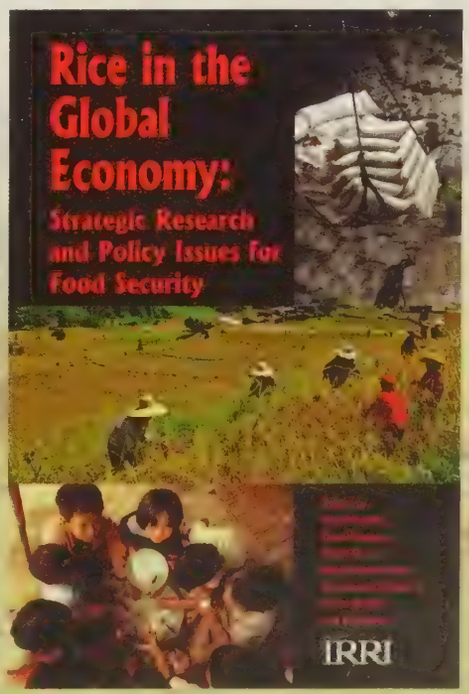
Globally, rice science is characterized by pervasive underinvestment. *Substantially increasing investments in research and development* for the future is urgently needed to assure the future food security of the poor. There are tremendous scientific opportunities for increasing farm-level productivity by raising the yield potential of both inbred and hybrid rice and even radical engineering of rice plants. Similarly, modern biotechnology tools can be used to reduce yield instability caused by climatic shocks that are likely to become more frequent with climate change. Improved crop management practices can similarly lead to an agronomic revolution that will help raise system-level productivity while reducing any adverse environmental effects.

Also, *policies and institutional reforms* are needed to achieve and sustain productivity growth while ensuring a stable supply of affordable rice for the poor. Policy reforms to liberalize both domestic and international rice markets are vital to ensure a timely flow of rice from surplus to deficit areas and to encourage private trade. A stable food supply for the future will require more, not less, trade.

Scaled-up safety net programs that are countercyclical to price shocks and well targeted to the most vulnerable are essential in order to improve food security. Improved institutional arrangements to better manage and coordinate irrigation, promote collective actions for improving system productivity, explore opportunities for value addition through improved postharvest management, and promote farm consolidation for higher efficiency are likewise important for improving food security for the future.

Dr. Pandey is a senior economist at IRRI.

A more detailed version of this article is available as a mini review in IRRI's online technical journal, International Rice Research Notes, at http://irri.org/irrn. The book can be ordered at RiceworldBookstore@cgiar.org and downloaded online at http://irri.org/books. View video clips shot during the official launching of the book at the 3rd International Rice Congress at http://snipurl.com/1rlh9k.



Making dreams come true

by Bianca Ferrer

Dr. Shaobing Peng reveals how an unlikely choice to pursue a career in agriculture turned out to be the best choice he has ever made

"My story of going into agriculture is like an irony of ironies," Dr. Peng recalls. "In 1979, when I took the university entrance exams, which were given every summer in China, my score wasn't high enough. It was just a little above the passing mark."

Since his parents were not well educated, the future Dr. Peng sought advice from his classmate's father. He said he remembered asking, "Uncle, with my score, what university should I apply for?" Without hesitation, his elder replied, "You go to an agricultural university."

"That came to me as a big shock," Dr. Peng recounts fondly. "I never considered going into agriculture." His classmate's father told him that this was his best chance if he wanted to be accepted by a major university.

Back then, Dr. Peng said that he dreamed of going to bigger cities where major universities were located and he realized that, indeed, that was his best chance to live his dream. "So, I chose agriculture, got accepted, and studied at Huazhong Agricultural University in Wuhan."

Joining IRRI

Years later, Dr. Peng received his master's degree at the University of California (UC), Davis, where he met Kenneth Cassman, who became his thesis adviser and, later on, also became one of the division heads at the International Rice Research Institute (IRRI). When Dr. Peng finished his PhD at Texas Tech University and was doing 15 months of postdoctoral work at the Citrus Research and Education Center at the University of Florida, Dr. Cassman sent him a letter encouraging him to apply for a job at IRRI.

"It wasn't an easy decision to make," Dr. Peng says. "I had to decide whether I wanted to stay in America or go to the Philippines. I couldn't make an outright decision but, nevertheless, I gave the interview a try and flew to the Philippines."

He arrived in the country in early January of 1991. During his interview, he

CHRIS QUINTANA (3)

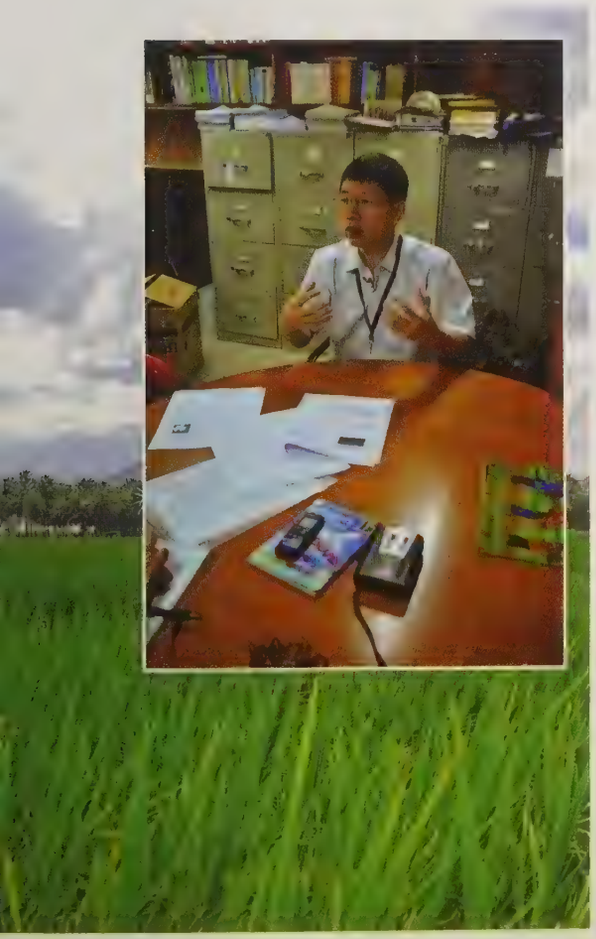
met Dr. Klaus Lampe, who was then the IRRI director general. He told Dr. Peng that IRRI never had a full-time scientist from mainland China and offered him work with the Institute.

During his undergraduate years in China, both his textbooks and his professors often mentioned IRRI. "As early as then," Dr. Peng adds, "IRRI was ingrained in my mind as it had long been internationally recognized for its rice research. I knew IRRI was the best. So that helped me decide to join the organization."

But his decision met with another setback. In the early 1990s, China was still not that open to the world and Dr. Peng needed to get permission from his government to allow him to work at IRRI. So, Dr. Lampe did all he could to convince the Chinese government, the Ministry of Agriculture, and Dr. Peng's former university to allow the then young scientist to work at IRRI. His efforts paid off.

All about teamwork

Dr. Peng joined the Agronomy, Plant Physiology, and Agroecology Division headed by Dr. Cassman. He worked closely with plant breeders such as World Food Prize Laureate Dr. Gurdev Khush (with Dr. Peng in photo below) on some projects that included improving the yield potential of rice. One of the most memorable projects he came across was a field trial of a new plant type material—an improved tropical japonica variety—in the dry season of 1994. He said the crop looked beautiful in the field and his whole team visited the field almost every day.



"Everybody was hopeful that, finally, we were going to break the yield barrier in rice—more than 10 tons per hectare," Dr. Peng says. Their high hopes, however, got burned when, 2–3 weeks before the crop matured, brown planthoppers attacked and destroyed the whole field.

"That experience taught us that breaking the yield barrier of rice is not that easy," Dr. Peng explains. "This is because it requires more people working from different directions, in different disciplines, such as plant breeders along with agronomists, and it also needs more research funds to support it.

"The work of crop physiologists," he adds, "plays a supporting yet important role for plant breeders and agronomists. Not only should they be willing to patiently wait a little longer to see an impact, but they should also be willing to play a minor part in a bigger team, so multidisciplinary collaboration would work."

More time in the field

He advises young crop physiologists to devote a little more time to the field rather than to the laboratory because, while they may find molecular techniques or approaches truly interesting, they should also study a plant in its real environment because interaction between a crop and its environment is very important.

Dr. Peng recommends IRRI as a good place to do good science, especially for his field of study. "I've never seen a better place to do crop physiology research anywhere in the world but IRRI because there's a good national staff for support and plenty of fields," he explains. "That is why I had a productive career at IRRI."

In one of his studies, for example, Dr. Peng investigated high nighttime temperatures as one of the likely causes for a 15% drop in rice yields. He noticed that, in the dry seasons of 1999 to 2001, his team couldn't get a yield of 9–10 tons per hectare. Instead, their yields just nudged 7–8 tons per hectare despite using the best varieties and management practices in fields.

"Before 1999, we could easily reach 9–10 tons per hectare in the dry season, so I was a little bit worried and asked myself what was going on," Dr. Peng says. "I analyzed the weather data of these three seasons and found out that they all had higher nighttime temperature. I sent a message to everyone in the Institute to report this observation."

But Dr. Peng believed that he needed to investigate more. So, he used crop yield and weather data from 12 seasons (1992-2003) and found a strong negative relationship between crop yield and seasonal average nighttime temperature the higher the temperature, the lower the yield. The result was published in a major scientific journal, *Proceedings of the National Academy of Sciences of the United States of America* (http://bit.ly/esatT5). "Not only do I think that this was my most interesting research, but it also had a high impact across the rice research community," Dr. Peng shares. "This article has been cited by other researchers 148 times since 2004.

"Staying with IRRI for 19 years will make it difficult for me to say that it has never had or will never have a place in my life," he continues. "I have always strived to do something good for IRRI because I believe in its goals and mission of feeding the world.

"When I go back to China, I aspire to organize people from high positions and IRRI alumni to do something collectively for IRRI," Dr. Peng says, his eyes smiling, brimming with hope for the future. "Once I take up my new post at Huazhong Agricultural University, one of my missions will be to prepare the next generation of crop physiologists."

Agriculture was an unlikely choice for Dr. Peng when he started his career in China many years ago. "But looking back now," he says, "I have no regrets in choosing agriculture. It turned out to be a good decision."

View Dr. Peng's exit seminar on crop physiology research at IRRI on YouTube at http://snipurl.com/peng_seminar.

Bridging the gap

by **Trina Leah Mendoza** and **Grant Singleton**

Good agricultural practices are sweeping across Asia and improving technologies for better rice quality

BILLBOARDS OF the *Mot Phai, Nam Giam* (One Must Do, Five Reductions) program are spread across An Giang, Vietnam.

GRANT SINGLETON

In 1997, as a reaction to the growing concerns of consumers, British food retailers working with supermarkets in continental Europe decided to harmonize their different standards and procedures on product safety, environment, and labor. This initiative, called Global GAP (good agricultural practices), developed "good practices" in conventional agriculture, which highlighted the importance of integrated crop management and a responsible approach to worker welfare.

According to the Food and Agriculture Organization of the United Nations, GAP are "practices that address environmental, economic, and social sustainability for on-farm processes, and result in safe and quality food and nonfood agricultural products."

The idea of Global GAP certification attracted more and more producers and retailers around the world as global trading emerged. This is recognized internationally and has been in place for many years, particularly for vegetable and fruit crops. GAP for rice, however, is still in its infancy.

FIELD WATER tubes are used in alternate wetting and drying technology to help farmers observe the water level in their fields.

Raising the bar

Although appropriate adoption and monitoring of GAP will help improve the safety and quality of food and other agricultural products, there are some challenges, especially for small-scale farmers. These farmers are highly at risk of not meeting export standards, unless they are sufficiently informed and organized by their government and other public agencies.

The International Rice Research Institute (IRRI), through the Irrigated Rice Research Consortium (IRRC), strives to give small-scale rice farmers a chance to join export markets by providing them with best rice-growing practices to be able to pass GAP standards.

In Vietnam

The IRRC has been working closely with Vietnamese colleagues to develop best practices for lowland rice production as a platform for GAP certification. Some provincial governments in the Mekong Delta are now offering a guaranteed 20% premium for rice produced under Global GAP certification.

So far, only five farmer groups have been certified, with three of them coming from An Giang Province. The certification included the farmers' adoption of the *Mot Phai, Nam Giam* (One Must Do, Five Reductions) program—a platform for environmentally sustainable and efficient production of lowland irrigated rice.

The program builds on Vietnam's *Three Reductions, Three Gains* policy that encourages farmers to reduce seed rate, fertilizer use, pesticide use, water use, and postharvest losses. These practices build on the "one must do," which is to use certified seeds.

Running for five planting seasons now, the program has conducted 108 training courses attended by 2,518 farmers, who have applied the new technologies to 3,360 hectares of their farmland.

Farmers who apply the technologies get the same yield as nonpracticing farmers, but save more in production costs (about US$200 per hectare per season). For the summer-autumn crop, this amounts to almost a 25% increase in profit, but, for the autumn-winter crop, the farmers get double in profit. The reduced input use of farmers, particularly of pesticides, also reduced the risk of environmental pollution and of pest outbreaks.

With the success of the An Giang rice GAP model, plans are being made to further scale out the technologies to 12 other provinces in the Mekong Delta. Farmers in these provinces generally have substantially lower rice yields than in An Giang, so the IRRC expects the extension of new technologies under *Mot Phai, Nam Giam* to increase yields as well as production efficiencies.

In Indonesia

The 2008 rice price crisis led the Indonesian government to launch a national program to increase the

country's annual rice production by 5%. In 2011, this has been increased to 7–10%. South and Southeast Sulawesi provinces have high potential to increase production. Thus, in March 2008, IRRC scientists were commissioned by the Australian Centre for International Agricultural Research to lead a collaborative project with the Assessment Institutes of Agricultural Technologies and the Indonesian Center for Rice Research to raise rice productivity in these provinces.

Donna Casimero, an IRRI project scientist who was based in Makassar, Indonesia, introduced the best practices to manage water, weeds, nutrients, and pests to farmers in four selected villages.

Before the intervention, farmers tended to apply too much fertilizer at the early stage of the crop. Adaptive trials in farmers' fields compared the current farmers' practice with site-specific nutrient management (SSNM). SSNM plots showed higher yields in most villages. "I told them that feeding a young rice plant was similar to feeding a baby, and that it did not need that much milk," says Dr. Casimero. This simple message bore into the minds of farmers, and they reduced their fertilizer application.

Rice farmers in Bendewuta, Southeast Sulawesi, used to spray herbicide for broadleaf weeds in their fields, when these were actually infested with grassy weeds. They were not aware of the different and proper herbicides to use, and they were clueless that they were losing 20–30% of their yield because of weeds alone. Dr. Casimero, also an agronomist and weed scientist, educated the farmers about different herbicides, which they tested on their plots. As a result, farmers now use the right herbicides and have come to realize the major effect of weeds on their yield.

Farmers who tried alternate wetting and drying technology, which allowed their plots to dry for several days, showed yield increases of 0.2–0.6 ton per hectare compared with yields of continuously flooded fields, which was their usual practice. They were also able to reduce the number of irrigation periods by 10–30%.

Farmers have also learned that they need to lessen pesticide use because there are farmer-friendly insects in the field that need to be protected.

Having seen the benefits of these practices, farmers are now testing two or more of these technologies together in their fields. "We are happy," claims one farmer. "We got 3 tons per hectare in 2008 and 5 tons in 2010." Another farmer reported more than a 100% increase in rice yield: "Two and a half years ago, I had 3.5 tons per hectare. This season, I got 7.3 tons per hectare." In 2010, farmers in four selected villages received a total of 1.8 million rupiah (US$204) more in net returns than farmers who did not try the practices.

INSTEAD OF spraying insecticides, farmer-partners in Southeast Sulawesi now set up traps to catch male white stem borers.

DONNA CASIMERO (2)

Driven by the enthusiasm of the farmers and Indonesian partners, the IRRC will continue to provide technical assistance to spread best practices to more districts, with funding from the Swiss Agency for Development and Cooperation.

Embracing GAP

Countries such as Thailand and Lao PDR are also exploring GAP for rice. In Thailand, it is at an early stage of diffusion among farmers. Thailand endorsed GAP for rice nationally in 2008 and a 19-member committee was formed to develop standards for rice. Now, about 50,000 Thai farmers have been registered for rice GAP. This is, however, different from the standards of Global GAP.

Thailand has modified Global GAP standards into quality management systems (QMS) for specific commodities. Since 2004, more than 300,000 farmers have been educated on QMS for 28 kinds of crops.

These guidelines covered pre- and postharvest practices to raise standards and certify those that meet all criteria. Farmers are encouraged to record their practices in diaries, and these practices are reviewed and ratified by the Thai Rice Department. Rice GAP standards, for example, require Thai rice farmers to keep water and land free from hazardous contamination and to follow the registered-label use of pesticides. Harvesting should be done 25–35 days after flowering, and drying within 24 hours.

A knowledge bank for rice GAP

To capture all the best rice-growing practices for lowland irrigated rice, the IRRC has developed a GAP Web site that can be accessed via IRRI's Rice Knowledge Bank (www.knowledgebank.irri.org/rice). The site provides practical solutions to help rice farmers boost yields, improve grain quality and production efficiency, and adopt more environmentally sustainable practices.

The Web site synthesizes decades of collaborative research and development from IRRI and its many partners on best management practices for irrigated rice, and it will continue to incorporate new knowledge in the future.

Filling in the gap

This April, the IRRC is funding an international symposium in Bangkok, Thailand, on GAP for rice in Southeast Asia to enable countries to share their experiences in establishing and promoting rice GAP. One outcome of the meeting will be the development of a rice GAP network for Southeast Asia.

Through the IRRC, IRRI is paving the way for small-scale rice farmers to benefit from best management practices that will ensure them of higher profits and healthier harvests. The adoption of GAP will enable them to develop market opportunities for higher quality rice both domestically and internationally, and help fill in the gap between them and wealthier farmers.

EVEN GROUNDS

by **Bianca Ferrer**

Laser land leveling is fast changing the face of traditional farming in South Asia

A LASER land leveler plows a field in the village of Matiala, western Uttar Pradesh.

Few countries in Asia are familiar with precision land leveling or laser land leveling, but, in India, the technology has already been adopted in many states and it has almost become an indispensable tool in agriculture. Through laser land leveling, farmers are able to save water and reduce their irrigation cost because laser-leveled fields, unlike traditionally leveled fields, allow better water coverage and more efficient irrigation.

Around 7,000 Indian farmers now own 10,000 laser land levelers and close to 1 million hectares of land in India have been laser-leveled.

"For traditional agricultural practices of the rice-wheat farming system, pump irrigation is common," says Raj Gupta, regional facilitator of the Rice-Wheat Consortium (RWC) for the Indo-Gangetic Plains. "Electricity consumption from pumping underground water can reach 800 kilowatts per hectare per year and leveling the land could help save up to US$65 million annually."

"Laser leveling allows us to use more efficiently water that, at times, becomes scarce," he added. "Also, compared with unleveled or traditionally leveled fields, laser-leveled fields can save 18 centimeters of water. With about 1 million hectares of land that has been laser-leveled, this translates to 2 cubic kilometers of water saved—roughly the size of a lake that is 2 kilometers long, 1 kilometer deep, and 1 kilometer wide.

"Laser leveling not only allows even distribution of water so that it can be used more efficiently but it also leads to better nitrogen-use efficiency, which helps give us a much better crop stand," he concludes.

Leveling the land using laser systems has also become a source of income for farmers as they rent the units to fellow farmers at 500 rupees ($1) an hour. Sometimes, these farmers hire out the system to three to four other farmers to level their fields, working in shifts. "The laser land levelers give the farmers an extra source of income aside from helping increase their productivity," cites Dr. Gupta.

Farmers in India enjoy benefits similar to those enjoyed by farmers in Pakistan, from where Dr. Gupta and his colleagues from the RWC first stumbled upon the technology.

VILLAGERS HELP a local service provider, who rents out a laser land leveler to farmers, do land surveys.

RAJ GUPTA, RWC (3)

In 2002, the RWC team visited farmers' fields in Pakistan. During the field trip, they saw fields that had been laser-leveled. "We got good feedback from the farmers," explains Dr. Gupta. "They liked laser leveling very much because it helped them save water, get extra income from renting out the units to other farmers, and increase their productivity. So, we decided to introduce laser land leveling in India."

In the same year, a laser land-leveling unit was supplied by Spectra Precision, Inc., a dealer in Hyderabad, India, and was brought to a farmer's field in Haryana for testing. However, the technology was not a success because the system buckled and was taken back for further improvements. It did, however, provide two important lessons: that the unit's automatic hydraulic scraper bucket should be assembled with locally available materials and that local service providers had to be able to handle defects in their small workshops.

After the first unsuccessful attempt, the RWC asked Joseph Rickman, an agricultural engineer at the International Rice Research Institute (IRRI), to

develop a hydraulic scraper bucket for a 50- to 60-horsepower tractor that was fitted with a laser land-leveling unit. As he had gained much experience from his projects in Cambodia and Thailand, Mr. Rickman developed an automatic scraper bucket with Beri Udyod Ltd., a local manufacturer, which offered him free use of its workshop facilities. As a result, they were able to build the hydraulic scraper bucket using local automobile components and they connected it to a tractor-driven land-leveling unit.

The machine was tested on a farm in Karnal Province and the results were encouraging. This then led to a larger demonstration and a training workshop at the Indian Agricultural Research Institute in New Delhi, where about 200 agriculture professionals, service professionals, and local manufacturers attended.

Through an initiative to promote laser land leveling in northern India, similar to Spectra Precision, Inc., in southern India, another manufacturer came onto the scene and forayed into manufacturing units that copied the hydraulic scraper bucket from Beri and used a locally-procured control valve mechanism. Competitive manufacturing was born with Leica Geosystems and Beri producing the same units and nine other suppliers that came on board later.

In 2005, the Atomic Energy Commission in India also developed a prototype of a laser land leveler but, although it was successfully developed using locally-available materials, it failed to be mass-produced. Meanwhile, India's private sector also developed prototypes of laser land levelers and, at the same time, through contacts with foreign suppliers, imported other units from the U.S. to India.

Many on-farm demonstrations, field days, and training workshops took place. Units were produced in Karnal, Ludhiana, Uttar Pradesh, and Bihar by 2006 so the technology could reach farmers' fields more effectively. One of the farmer-service providers, Ranjeet, together with his brother, undertook more than 200 field demonstrations in Bihar's 12 districts covering West Champaran to Purnea from 2007 to 2008.

Through subsidies provided by the state governments of Haryana, Punjab, Bihar, Uttar Pradesh, and others, farmers were soon able to purchase their own units, which they also rented out to other farmers. A cooperative in Patna and Samastipur districts in Bihar called the Primary Agriculture Credit Society, along with a farmers' seed village in Begusarai, promoted laser land leveling together with their other resource-conserving technologies.

The Department of Agriculture in Bihar also bought five units of laser land levelers for demonstrations in 2008-09. During the same years, Dr. Apurba Chowdhury and his team from Uttarbanga Agriculture University procured three units of laser land levelers in Kochbehar and Dakshin Dinazpur for farmer participatory trials.

Moreover, Dr. Paritosh Bhattacharyya from the West Bengal Department of Agriculture took seven more units of laser land levelers to different districts of West Bengal. This then became a collaborative effort with the Indian Council of Agricultural Research.

The experiences gained in farmers' fields helped further improve laser land levelers. Punjab Agriculture University also took the initiative of modifying the hitch system for the scraper bucket, allowing it to improve its turning radius by 27% and the maneuverability of tractors in small fields.

Another innovation made on the machine was the addition of a quick-release hydraulic coupler that enabled it to be attached to or detached from the tractor. This helped free the tractor when the laser land leveler was not in use and restored the tractor to being a multiutility vehicle. This led to a total of 20 units sent to Bihar, West Bengal, Punjab, Haryana, and western Uttar Pradesh.

Since then, more improvements were made on the leveling unit such as adding double wheels to it to reduce the load on the tractor, which increased the machine's capacity by 25%. An improvement that included a powered mast for finer elevation setting of the receiver not only enhanced mast-receiver control on the laser land levelers but also boosted fuel and tractor efficiency during leveling.

"Like in India, where the technology started with one unit, but has now grown to 10,000 units, farmers in Bangladesh and Nepal, where the technology was introduced in 2008, are also keen to purchase more," says Dr. Gupta.

Each country now owns three units and the technology has been introduced in the Cereal Systems Initiative for South Asia, a collaborative project among IRRI, the International Maize and Wheat Improvement Center, the International Food Policy Research Institute, and the International Livestock Research Institute.

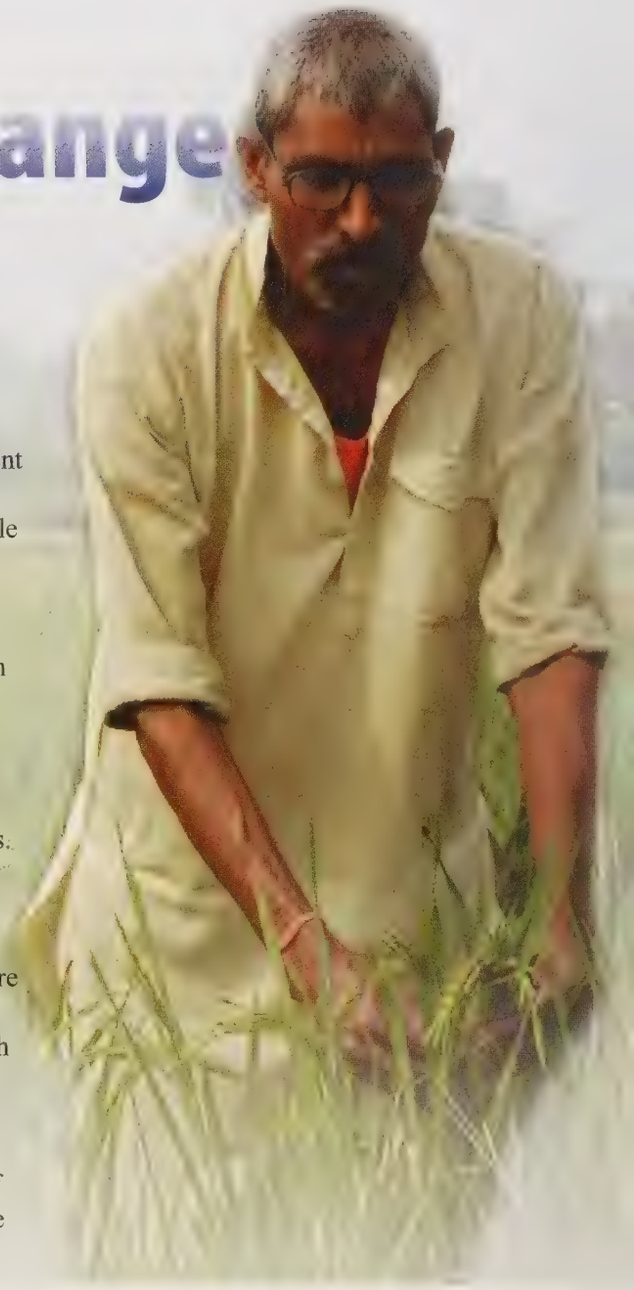
With joint efforts among different organizations and Consultative Group on International Agricultural Research centers, laser land leveling could become an indispensable tool for agriculture in Bangladesh and Nepal, holding lots of promise for farmers.

USAID AGRICULTURAL advisor Robert Bertram (*right*) tests a laser land-leveling unit with Indian agronomist R.K. Naresh (*left*).

Ready for climate change

Story and photos by **Mutya Frio**

Farmers are fast adopting stress-tolerant varieties of rice to head off yield losses



Ram Behal Maurya (*right*), 54, coughs as he settles himself slowly on a run-down cot just outside his house. In 10 days' time, he and his sons will be harvesting rice from a small piece of land he inherited from his father. Unfortunately, Mr. Maurya's farm is in one of the flash-flood-prone areas in the eastern state of Uttar Pradesh in India, where crops can be completely wiped out from floods. For a poor farmer tilling less than a hectare of land planted mostly with rice and wheat, he reaps an average of 1.6 tons of rice per hectare, barely enough to feed his extended family of 13 members until the next harvest. But this season, he has high hopes of getting a higher yield.

A growing number of subsistence farmers as well as seed growers are now planting "climate-change-ready" rice in the rice bowl state of Uttar Pradesh and the speedy uptake is unprecedented. The improved varieties are capable of surviving even under harsh environments such as drought or floods that are predicted to get worse with climate change or in problematic soils with high salt content that may become more widespread as sea levels rise because of climate change. The climate-change-ready rice has been bred into local mega-varieties that are high-yielding and widely grown by farmers.

Breeding for farmers

The International Rice Research Institute (IRRI), together with its partners, develops improved rice varieties that are tolerant of various environmental stresses, helping farmers curb yield losses, particularly those who farm on stress-prone farmlands.

Through IRRI's research, plant breeders have identified a gene that confers tolerance of submergence and chromosomal regions that confer tolerance of drought and soil salinity. The result is a rice variety that is resilient to a particular environmental stress, is high-yielding, and retains other desirable qualities of the original variety, such as good grain quality and palatability. Under the IRRI-led project Stress-Tolerant Rice for Poor Farmers in South Asia and Africa (STRASA), farmers now see the results in their own fields. Thousands more in India and parts of South Asia have been adopting stress-tolerant varieties at unprecedented rates.

Seeing is believing

About 78 kilometers away from Mr. Maurya's farm is Rampur Village, where Kamalawati Ramkeval (see photo on page 19) is happy with her harvest. Both farmers suffer from annual harvest losses caused by incessant rains and flash floods. IRRI plant breeders found that the *SUB1* gene confers tolerance of submergence. They bred the *SUB1* gene into the mega-variety Swarna, a high-yielding variety widely grown in Uttar Pradesh. In field trials, Swarna-Sub1 survived up to 14 days in floodwater and outyielded flood-susceptible varieties by at least 1 ton per hectare. In 2009, Swarna-Sub1 was officially released for planting by the government of India.

Mr. Maurya and Ms. Ramkeval each planted the flood-proof Swarna-Sub1 in their respective fields during the *kharif* or monsoon season. Although his crop was under floodwater for 12 days, Mr. Maurya was able to harvest 2.5 tons per hectare of unmilled Swarna-Sub1, almost twice his harvest from variety Soankhar of past cropping seasons. Although Soankhar has the ability to grow as water rises, it yields barely 1 ton per hectare. As for his latest harvest, Mr. Maurya intends to keep a small portion of Swarna-Sub1 seeds for planting next season and sell the remaining seeds to farmers in adjoining villages.

Ms. Ramkeval, on the other hand, was lucky as her field was not flooded this year. She harvested 6.5 tons per hectare of unmilled Swarna-Sub1. "I will save the harvest for my family," she says. "We work hard to grow it so we'd rather not sell it." Like Mr. Maurya, she has seen a substantial increase in yields in her family's rice fields and she plans to keep some of the seeds for the next monsoon.

Meanwhile, Meera Prabunath, also from Rampur Village, had a bountiful harvest but of a different rice variety. In the past, her less-than-a-hectare land was left to fallow because of drought. In 2010, Ms. Prabunath planted seeds of a drought-tolerant rice variety released in India as Sabhagi dhan. IRRI scientists developed this variety through conventional breeding but have now discovered the region of a chromosome, known as quantitative trait loci (QTLs), that contains genes believed to express drought tolerance. These QTLs will

be used for breeding in the same way as the *SUB1* gene to develop drought-tolerant rice varieties. Last season, Ms. Prabunath harvested 4.15 tons per hectare of Sabhagi dhan, transforming a formerly drought-prone land into a viable source of sustenance and income for her family.

The key is in partnerships

New rice technologies, such as these stress-tolerant varieties, will hardly make a dent in ensuring food security in the household and nationally unless they are widely adopted by farmers. Some effective mechanisms make new rice varieties accessible to and adoptable by farmers. The key to success is through partnerships.

In India, IRRI has been working with various stakeholders to develop and disseminate climate-change-ready rice. These partners are national and state governments, agricultural research and extension centers, universities, nonprofit organizations, farmers' groups, and seed growers.

What makes climate-change-ready rice easily accessible to farmers is that various research institutions have already been multiplying the seeds even before the variety is officially released by the government. Dr. Umesh Singh, IRRI senior scientist and project coordinator for STRASA in India, says, "Once it is released, we encourage state governments as they distribute the seeds to seed corporations for large-scale multiplication, and they also disseminate the seeds directly to farmers in target areas. Farmers do not have to wait for 2–3 years for mass distribution."

Furthermore, IRRI has partnered with India's National Food Security Mission (NFSM), the national government's mega-scheme that aims to increase food self-sufficiency in targeted states where food production is low. In 2010, NFSM distributed 16,000 mini-kits (5-kilogram seed packets) of the flood-proof Swarna-Sub1 in Uttar Pradesh in time for the following year's *kharif*. Through targeted dissemination, IRRI has identified more than 2,000 flood-prone villages in Uttar Pradesh. Each village received 5–10 mini-kits of Swarna-Sub1.

More seeds had to be multiplied. In time for last year's *kharif*, the state government of Uttar Pradesh launched a program for seed multiplication of Swarna-Sub1, to be planted on 1,200 hectares. "The STRASA project is very important to us," says Dr. Mukesh Gautam, director of agriculture in Uttar Pradesh. "About a million hectares of land is flood-affected," he reveals. "We fully support the production of Swarna-Sub1 and we see this improved variety eventually replacing the original Swarna variety."

In 2010, NSFM approved the distribution of 69,000 mini-kits for planting on more than 11,000 hectares all over India.

From the grass roots

Agricultural extension agencies, farmers' groups, and nonprofit organizations are highly effective conduits of technology dissemination because they are directly in touch with farmers. One such organization is Nand Educational Foundation for Rural Development (NEFORD), which helps spread information about Swarna-Sub1.

"Farmers have to be convinced of the technology first," says Dr. R.K. Singh, NEFORD executive director. "Then, we do a systems technology transfer—not just mere technology transfer, but a model where all the elements are in place."

Kissan mela or a farmers' fair is also a good venue for farmers and input providers, where Swarna-Sub1 seeds can be purchased at an affordable price subsidized by the government. Using mass media, both state and national media, helps spread the word not only to farmers and seed growers, but, more importantly, to policymakers and other players in the rice sector.

"Once you have created a demand for the technology, you can promote it and influence policy," Dr. R.K. Singh shares. "This is how it worked for us in promoting Swarna-Sub1."

Moreover, making the technology affordable and available to farmers ensures a quick adoption. The Gorakhpur Environmental Action Group (GEAG), a nonprofit organization, helps sell Swarna-Sub1 seeds to farmers at a subsidized rate of 18–20 rupees or less than half a dollar per kilogram. GEAG purchases the seeds from the Baranas Hindu University, which multiplies the seeds.

"When farmers see satisfying results, they ask where they can get seeds," says Dr. Anita Singh, GEAG project coordinator. "In 2010, more farmers multiplied Swarna-Sub1 seeds and this will continue to grow. More seeds need to be distributed in 2011."

Meanwhile, a Primary Producers Company (PPC) was established by Grameen Development Services (GDS) in Uttar Pradesh, another partner in the STRASA project. The PPC, led and managed by farmers, is a registered company licensed to sell and market seeds, register seed producers as members, run a seed processing plant, and distribute and sell fertilizers. It boasts of 1,500 farmer-members who can procure seeds from universities at a wholesale rate, thus avoiding the black market where prices can become exorbitant.

"Through the PPC, farmers reduce the middlemen in the process of procurement and distribution," explains Ghansyan Mishra, GDS project coordinator. "They can now procure truthfully labeled seeds directly, instead of waiting for a long time for certified seeds to come into the market. We want to reduce the time lag and the inputs."

Truly, forging partnerships with the public and private sector as well as with nonprofit organizations is key to a successful technology adoption. For small farmers like Ram Behal, Kamalawati, and Meera, they are the ultimate measures of success where the products of research are gaining ground fast.

COUNTRY HIGHLIGHT:

IRRI in Indonesia

Compiled by **Maria Lizbeth Baroña**

Indonesia had about a hundred million mouths to feed when it achieved rice self-sufficiency in 1984.

From being a heavy rice importer in the 1970s, Indonesia today is the third-largest rice producer in the world, and has been consistenly so since the 1970s. From 1970 to 2006, Indonesia's average rice yield rose by more than 95% from 2.35 tons per hectare to 4.62 tons per hectare. Most of Indonesia's rice-producing areas are on the island of Java, home to more than half of Indonesia's population. Jakarta, the capital, is located in West Java.

To attain higher rice production, Indonesia had to develop and deploy new varieties of rice and adopt crop management technologies. The Indonesian government also played a significant role in the process, helping the country achieve consistent annual growth in rice production until it became self-sufficient in 1984. For one, government policies stabilized prices for urban consumers and expanded domestic output by disseminating high-yielding varieties (via government extension programs), fertilizer subsidies, and investment in irrigation infrastucture.

Today, Indonesia is the 7th most populous country in the world. A population increase of 1.5% per year requires a corresponding increase in food supply. It is in this context that Indonesia's agricultural development program aims to (1) increase national food security through higher food production and lower food imports, (2) increase value added to and competitiveness of agricultural products, and (3) improve quality of life and lessen poverty for farming households through high productivity.

IRRI and Indonesia

The Indonesian government recognizes the importance of research and technology in national development. The International Rice Research Institute (IRRI) and Indonesia formally started collaborating in December 1972.

This partnership was hatched when both parties agreed to cooperate on the improvement of rice research through the country's National Rice Research Program. The highest priority was given to the genetic evaluation and use of rice, the implementation of improved rice-based cropping systems, development and testing of machinery for small-scale farming, and training of Indonesian scientists.

Genetic diversity

IRRI conserves in its International Rice Genebank 9,001 Indonesian rice accessions, including lowland, upland, and tidal swamp varieties. National research centers in Indonesia are also exploring the potential of the country's traditional types of rice in generating new, improved varieties.

Modern varieties

One of the significant factors that contributed to the consistent increase in Indonesia's rice productivity was the spread of high-yielding varieties. In 1984, when Indonesia achieved sustainability, 85% of the rice farmers were using high-yielding rice varieties.

IR64 was released in 1986 and has remained popular until today because of its quick maturity and good eating quality. Another popular variety is Ciherang, released in 2000. In 2009, six varieties were released in the country, including flood-tolerant varieties Inpara 4 (Swarna-Sub1) and Inpara 5 (IR64-Sub1).

Until 2009, more than 74 varieties had been released in the country.

Drought tolerance

Drought often threatens rice crops in rainfed fields, particularly during the second or dry-season cropping. Research in Jakenan, Central Java, found three possible drought-tolerant rice varieties from IRRI with high yield potential that are suitable for the second crop: IR68833, IR68836, and S3376e. Another potential variety for Indonesia is IR78581-12-3-2-2, which has better eating quality. It is currently being tested at a research station in Java.

Indonesia: fast facts

Population:	245 million[1]
Total land area:	1.8 million sq km[1]
Total rice production:	60 million tons[2]

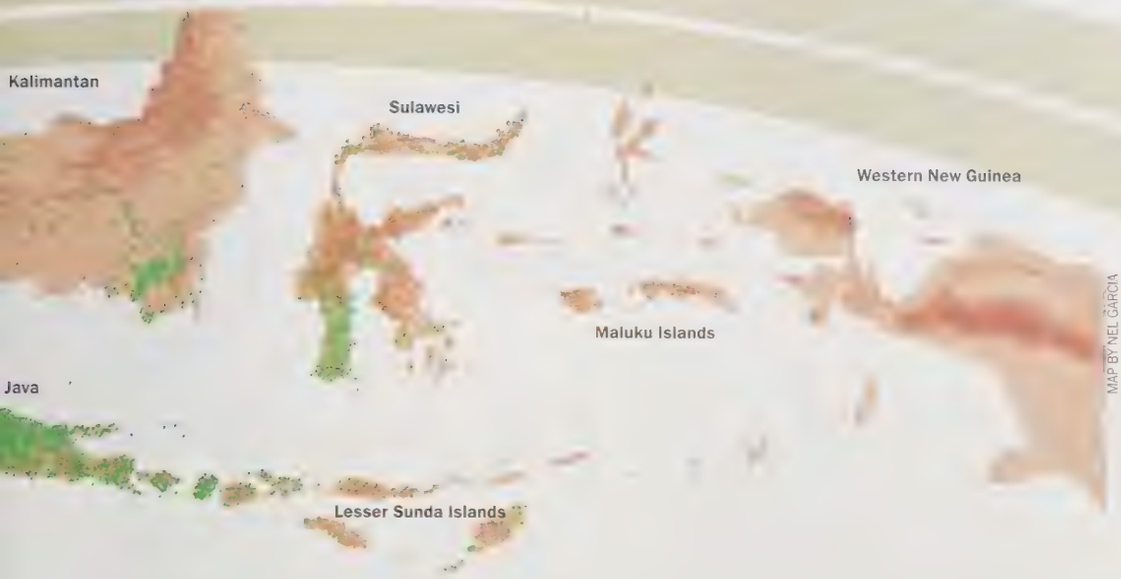
[1]CIA World Factbook
[2]FAOSTAT 2008

Submergence tolerance

In 2007, the area affected by flood in Indonesia was reported to be more than 200,000 hectares. Submergence-tolerant varieties developed by IRRI that are now available in the country include Inpara 3 (IR70213-9CPA-12-UBN-2-1-3-1), Inpara 4, and Inpara 5. These varieties can withstand submergence for up to 14 days. Another submergence-tolerant variety, Ciherang-Sub1, is in the pipeline for testing and release in the country.

Hybrid rice

In 2002, collaborative research between the Indonesian Agency for Agricultural Research and Development (IAARD) and IRRI identified two promising hybrid rice varieties, IR58025A/BR827 and IR58025A/IR53942, which were then released as Rokan and Maro, respectively. Two other hybrid varieties generated by IAARD using IRRI parents are Hipa 3 and Hipa 4, which were released in 2004.



Pests and diseases

Brown planthopper

A major challenge for Indonesian rice farmers during the past 3 years has been the high incidence of brown planthoppers (BPH)—a major rice pest. Together with the Indonesian Center for Food Crops Research and Development (ICFORD), the Indonesian Center for Rice Research (ICRR), and the Assessment Institute for Agricultural Technology (AIAT) Central Java, IRRI is supporting better management of BPH. This collaboration produced and distributed to all field extension offices in West and Central Java provinces a leaflet to help farmers better understand the pest and carry out better management practices to reduce damage to their rice crops.

Before the 1970s, national variety Pelita 1-1 dominated the areas planted with rice. It was later replaced by IRRI-bred IR26, IR30, and IR32, which are resistant to BPH, until a more virulent type of the pest attacked these varieties as well. Hence, in 1978, IRRI bred and released IR36, a new variety with high resistance to the more virulent type of BPH.

Rodents

IRRI, with support from the Australian Centre for International Agricultural Research (ACIAR), has developed a trap barrier system to control rats in rice fields. The barrier system has proven to be highly effective and environmentally safe. A study at the Sang Hyang Seri Seed Center at Sukamandi from 1998 to 2001 revealed that the average number of rats captured at a half-hectare field site during the wet season was 1,117, and 1,483 during the dry season.

Fertilizers

In collaboration with IRRI and various national and international institutions, the IAARD developed several methods and tools to increase the efficient use of nitrogen, phosphorus, and potassium fertilizers for lowland rice. They include a leaf color chart to assess the need for nitrogen fertilizer, and a soil test kit to check the need for phosphorus and potassium fertilizers.

Efficient use of fertilizer to avoid waste has become more important in the country following a reduction in government subsidies for fertilizer and higher fertilizer prices that occurred in 2010.

Site-specific nutrient management

An Indonesia-IRRI collaborative study on site-specific nutrient management confirmed the need to balance fertilizer application with the nutrient needs of the rice plant and the soil's capacity to supply the nutrients. The study indicated that site-specific nutrient management applied to farmers' fields in Java can increase average yield by 0.2 ton per hectare compared with traditional practices.

Nutrient Manager for Rice (NMR)

NMR, a software tool to help farmers make informed site-specific nutrient management decisions, has been released in Indonesia. This Indonesian version of *Nutrient Manager for Rice* is designed for high-yielding rice varieties in individual rice-growing areas. It requires an integrated training of researchers, extension workers, and farmers, supported by software and monitoring tools such as leaf color charts and soil test kits. (See video at http://snipurl.com/nutrient-management.)

The Ministry of Agriculture formally encourages site-specific nutrient management within the framework of integrated rice crop management.

"Both IRRI and Indonesia have common interests in accelerating rice research systems, and rice-based farming systems, and promoting rice technology to increase and sustain rice production. Great challenges in rice production are ahead of us, especially in dealing with climate change, diminishing natural resources, and the increasing population of pests and infection from diseases. For more than 30 years, Indonesia-IRRI research collaboration has generated some rice technologies that are expected to help in increasing rice production so that Indonesia could maintain national food security and enjoy rice self-sufficiency."

Dr Haryo Sembiring, ICFORD director

Future collaboration

Indonesia and IRRI developed a four-year work plan at a meeting held in Jakarta in January 2011. While both parties agreed that previous areas of collaboration will continue, they also concurred to focus on the following in the next 4 years:

- Varietal development to mitigate the effects of climate change;
- A national strategy for hybrid rice development;
- Research on abiotic stresses, particularly submergence, drought, salinity, and low-temperature damage in high-elevation areas;
- Support to implement integrated crop, pest, and resource management;
- Support to disseminate proven technologies, including postharvest technologies; and
- Support for socioeconomic policy research.

THE PILLARS OF AFRICA'S AGRICULTU

by **Savitri Mohapatra**

As more men seek greener pastures in the city, the women are left to farm and feed not just their families but the whole region

"When you educate a girl, you educate a nation." Nowhere is this saying more true than in the farming sector in Africa, according to Peinda Cissé, chair of a 35,000-strong farming women's group in Senegal.

Mrs. Cissé has been a vital conduit for moving agricultural research from scientists to farmers. She has spearheaded the production of foundation seed of improved rice varieties in Senegal, imparting to her group the knowledge she gained from researchers to ensure high yields and high-quality grain.

Praising women farmers, such as Mrs. Cissé, Rita Agboh-Noameshie, the focal person for gender research at the Africa Rice Center (AfricaRice), said that research has shown that, when women generate income through farming, processing, and marketing their goods, they produce high returns that benefit their families and communities as well.

"We have seen that women's incomes are the most important determinant of children's development and thus of future generations," Dr. Agboh-Noameshie explained. "Therefore, targeting women in agricultural technology dissemination can have a greater impact on poverty than targeting men."

African women in farming

More than in Asia, women in Africa play a central role in farming as they serve as pillars of the region's agriculture. Almost eight out of ten farmers that produce staple food in Africa are women, which means that women virtually feed the region. The high rate of male migration from villages to cities has left many women to play a bigger role in farming.

Despite women's significant contribution, the Food and Agriculture Organization (FAO) of the United Nations noted that rural women have less access than men to land, credit, labor-saving technologies, and resources such as fertilizer and improved seeds.

"In addition, when a farm enterprise that is managed by women shows signs of becoming profitable, it is usually taken over by men," Mrs. Cissé observed.

A study on gender inequity in irrigated rice systems by AfricaRice and its partners showed that women in the Senegal River Valley lack access to critical resources, such as land, training, credit, and machinery. More than 70% of the women surveyed did not know how to access land for personal use and 88% did not receive any training in rice production.

Similarly, a gender-mainstreaming analysis carried out as part of a project on inland valley-based rice and vegetable value chains in Benin and Mali showed that male farmers have more control over resources and access to training opportunities than women.

Listening to women farmers

In sub-Saharan African, rice is primarily a women's crop in rainfed upland and lowland ecologies. For example, a majority of West and Central Africa's 20 million upland rice farmers who grow rice are women.

Women provide the bulk of the labor in rice cultivation—sowing, weeding, bird scaring, harvesting, processing,

R. RAMAN (5)

and marketing. Similarly, in East African countries such as Tanzania and Uganda, women play a major role in their respective country's rice production.

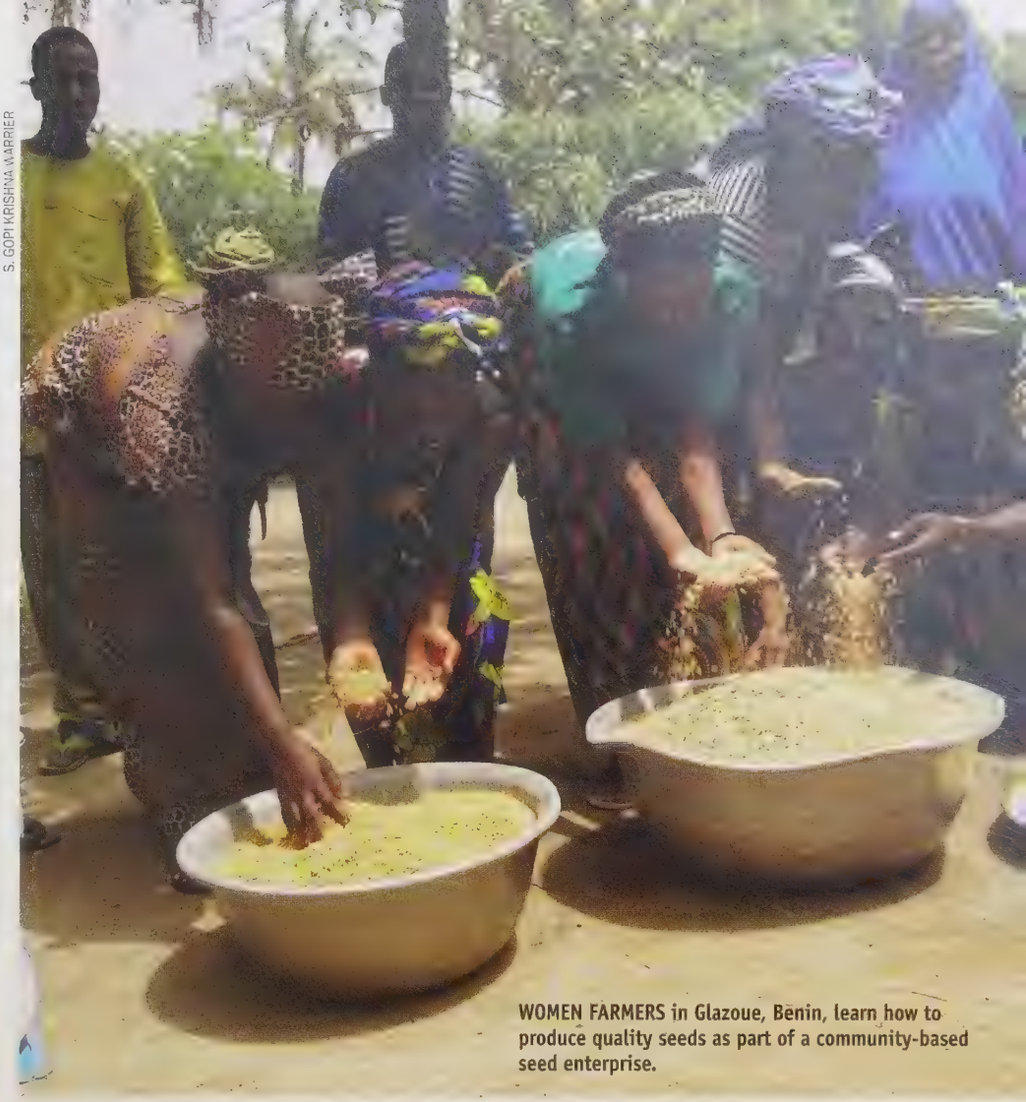
Recognizing their importance, since the 1990s, AfricaRice has been focusing on the needs of this group of farmers that had been generally neglected by agricultural research until then. Women farmers are invited to be part of participatory varietal selection (PVS) activities and their views are especially sought regarding new genetic materials.

The PVS approach was adopted to identify NERICA varieties that are best suited to farmers, particularly women farmers, typified by Bintu, a composite West African woman farmer who has been featured in several publications and videos on NERICA. (See http://snipurl.com/farmer-bintu.)

PVS exercises revealed that women and men rank plant traits differently, which reflects their different roles. For instance, women particularly preferred tall plant height because it takes the backache out of harvesting, especially when they carry their babies with them.

They also preferred traits that indicate weed competitiveness, since they are mostly involved in sowing and weeding. Processing and cooking qualities were also of more interest to women than to men. The women liked the early maturity of the upland NERICA varieties, as this shortens the lean or hungry season before harvest, when women struggle to feed their families.

Recent impact studies in Benin have shown that the adoption of NERICA varieties reduces the household's likelihood of being poor by 10%, with a higher reduction for female-headed households (14%) than for male-headed households (6%).



S. GOPI KRISHNA WARRIER

WOMEN FARMERS in Glazoue, Benin, learn how to produce quality seeds as part of a community-based seed enterprise.

Empowering women farmers

To improve rural women's access to learning, several thousand women farmers have been trained in rice cultivation, seed production, and postharvest techniques, particularly by the African Rice Initiative, with support from the African Development Bank, the United Nations Development Programme, the Japan International Cooperation Agency, the Common Fund for Commodities, the European Union (EU), and the International Fund for Agricultural Development (IFAD).

Rural women across Africa have also greatly benefited from learning about improved rice farming and postharvest techniques through innovative farmer-to-farmer training videos that have helped them improve the quality of their rice, increase their income, and gain empowerment.

In close association with the West and Central African Women Rice Farmer Group Association, AfricaRice is laying the foundation of a grass-roots seed enterprise in Benin, Togo, and Senegal. The project, funded by the New Field Foundation, EU, and IFAD, aims to link smallholder women farmers to research, microfinance, and markets, opening up opportunities for them to become successful businesswomen in producing and marketing seeds.

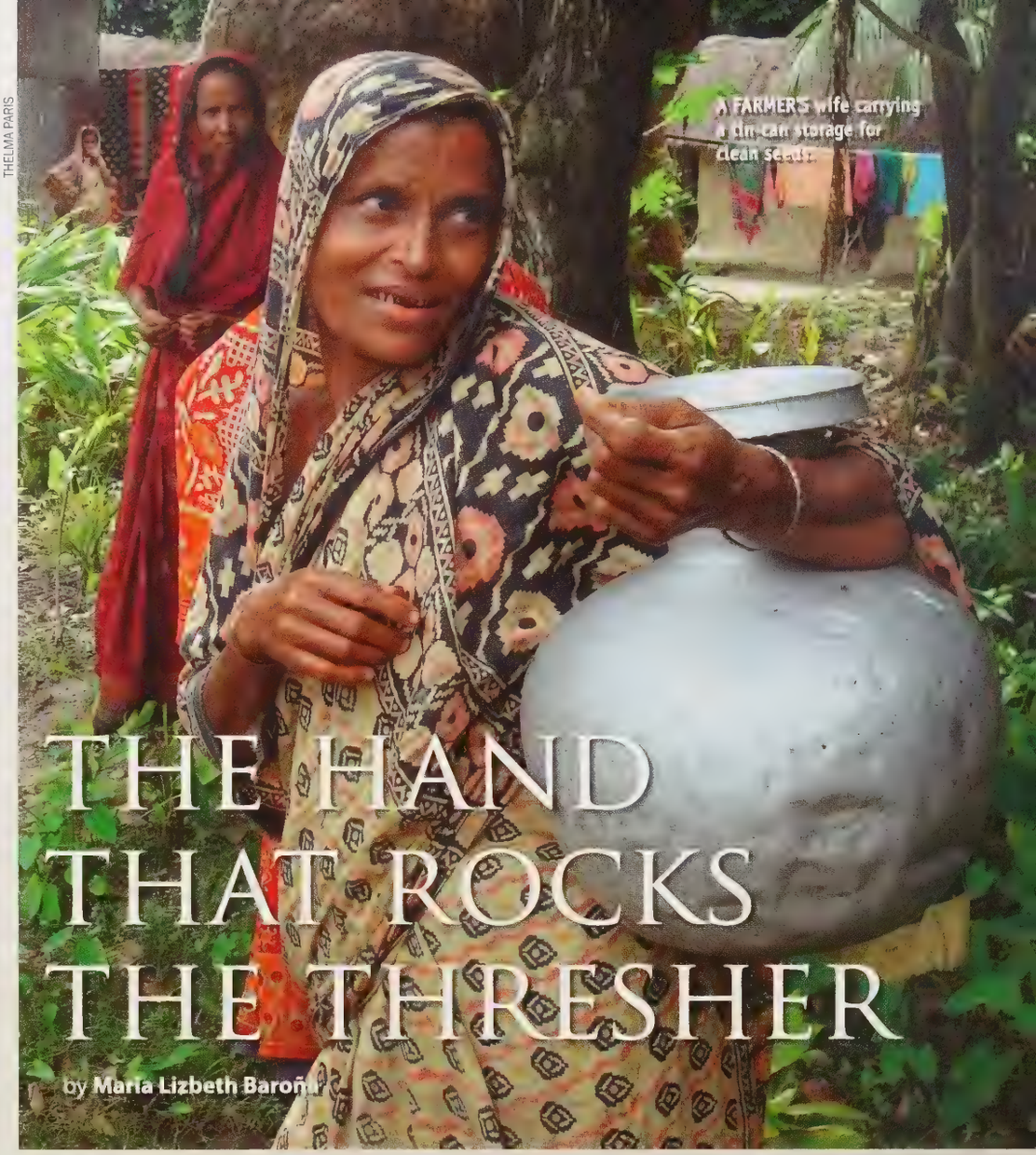
Global support for women

With increasing focus on gender mainstreaming, the recently launched Global Rice Science Partnership gives attention to how gender will be tackled in all its research activities.

African countries have also realized the importance of including women-oriented strategies. The National Rice Development Strategies that have been developed in several African countries with the help of AfricaRice and the Coalition for African Rice Development have highlighted this need.

As Liberia's Agriculture Minister Florence Chenoweth put it, "Helping female farmers is a good investment in the country's future. We know that, when we support women, more food and money go into feeding children at home."

On a farm in Dassa, Benin, a mother straps her baby on her back and joins the other women rice farmers in an arduous task of weeding. In Africa, 8 out of 10 rice farmers are women and they shoulder the bulk of the labor in rice production—while still minding the many responsibilities of their homes, such as caring for their children (see *The Pillars of Africa's Agriculture* on pages 22-23).



THE HAND THAT ROCKS THE THRESHER

by Maria Lizbeth Barroña

"Yes!" was the answer of women participants in a leadership training course when the facilitator asked them, "Has any one of you been put in a position to choose between work and family?"

The ensuing exchanged looks among the women—as if seeking affirmation from one another—reflected the inner conflicts that women deal with when their roles as a mother and as a professional are pitted against each other.

These women are professionals in Asia and Africa who help rural women break the conventional thinking that women play only a supporting role to their male counterparts in the family.

On the contrary, as highlighted in this leadership course, women without question play major and critical roles in the maintenance and success of rural livelihoods and household undertakings in their communities. Stereotypes, however, have downplayed their importance and put them in the shadows of the men.

This is why the International Rice Research Institute (IRRI) in 2002 started the *Leadership Course for Asian and African Women* to develop the leadership skills of women in agricultural research, development, and extension.

On the sidelines

"Women from poor farming and landless households contribute 20–75% of the labor required for rice production in Asia," explained Thelma Paris, senior IRRI scientist on gender analysis. "Unfortunately, gender inequalities in relation to access to resources and support services still persist due to erroneous assumptions and misconceptions as well as deeply embedded social norms.

"However, times are changing," she added. "In India, disparity in education among girls and boys is narrowing."

Changes in women's roles are also slowly happening in rural Bangladesh, where, typically, powerful social norms deter women's involvement in important decision-making processes in their homes and communities.

According to several gender studies in Bangladesh, poor women are more engaged than men in rice postharvest activities, including drying, threshing, seed selection, storage, and processing. One example is parboiling rice and turning it into different rice products for home consumption and selling.

Dr. Paris's studies conducted in Bangladesh in 2004 and in India in 2007 consistently showed that the male head of the household makes decisions on farm management. However, with the increasing male out-migration, women who are left behind are compelled to decide "on-the-spot" on things related to farming. Their ability to make sound decisions depends on their access to information about best farming practices.

"Even when women keep the family's income, they are not free to spend it as desired," Dr. Paris's study concludes. "Moreover, if the income is not enough, they bear the burden of borrowing and repaying loans to private money lenders."

There is a "disconnect" between the roles women actually play and the persistent perception that rural women who tend the household and manage major phases in rice production are mere housewives "who do not work" or hold no job. This perception has automatically excluded women farmers from participating in field demonstrations, farmers' field days, and other participatory field experiments.

To bridge this gap, one solution is to train female researchers and extension workers as leaders in their own institutions in an effort to give women more importance in agricultural research and development programs.

The women who attended the leadership course for research and extension in rainfed rice ecosystems are researchers and development and extension workers from Asia and Africa. Each participant had a story to share about how she is helping empower rural women.

Seema Khan from Nepal shared her struggles within her family and her community in helping bring about social change. She courageously pursued her education and is now president of the Nepal Muslim Women's Welfare Society, a nongovernment organization that aims to improve the economic, social, and political status of Muslim women and mainstream them in the national development process. Her story inspired the other participants in the training course to also persevere in their work with grass-roots women.

"This particular course attempts to rectify this gap through a women-to-women leadership course," said Dr. Noel Magor, head of IRRI's Training Center. "It has been very satisfying to observe the confidence women achieve in this course and their sense of solidarity."

Mainstreaming women

Dr. Paris has advocated the inclusion of female Asian farmers in IRRI's rice research and training programs for many years. As a social scientist working on gender issues in Asia, she also realized that gender inequities in resources and opportunities persist not only among rural women but also among professionals.

Thus, when a leadership course was offered by the Consultative Group on International Agricultural Research's (CGIAR) Gender and Diversity Program in 2000, she suggested that IRRI host the event—so IRRI's staff could attend at minimal cost.

The course then evolved to address Asian women's leadership skills in management, research, and extension. Dr. Paris developed a curriculum and piloted it in 2002 with the help of IRRI's Training Center. This course eventually became known as the Leadership Course for Asian Women. This year's course reached a milestone as it included the participation of women from Africa.

In the past 8 years, 160 participants from 26 different Asian and African countries have gone through the leadership course.

"Things have to change for women to be included in the decision-making processes in their families and communities," Dr. Paris explained. "Changes should start within themselves and their immediate families."

This change must give women the confidence and skills to be a leader, as well as the technical knowledge required to master rice production successfully. Empowering women like this will help society and give women opportunities in decision-making, particularly in areas that can affect their roles in their families and in their community.

The leadership course has earned raves from its attendees.

"I feel more confident and secure," shares Meghana Kelkar, an officer at the College of Agriculture in Maharashtra, India. The sentiment is shared by her compatriot, Umarani Ranganathan, a professor at Tamil Nadu Agricultural University, who said that real-life experiences shared by the resource persons and experts impressed her the most.

Making change possible—with helping hands

Dr. Paris has trumpeted gender issues since the beginning of her career. She said that she found her voice and shattered stereotypes because she was lucky to have mentors.

She credits distinguished rural sociologist from the Philippines Gelia Castillo as the person who supported her so she could see the unbeaten track and trailblaze it for others to follow. (See Castillo interview excerpt on YouTube at http://snipurl.com/castillo.)

IRRI

"Dr. Castillo mentored me," said Dr. Paris in the CGIAR's *Successful Women, Successful Science* report. "She did not take credit for my work. She opened doors for me and helped me open doors myself."

Thanks to this experience, Dr. Paris now sees the value of mentoring, and now serves as a mentor to all the participants in the training course and to young social scientists at IRRI.

Another important support mechanism for Dr. Paris's work was the fact that the CGIAR and IRRI have clear policies on gender.

It is within these institutional platforms that Dr. Paris successfully put gender analysis on the agenda for rice research.

The future

Gender analysis is securely included in the future of rice research. This has clearly been etched in the Global Rice Science Partnership (GRiSP), a partnership representing a single work plan and strategy for global rice research (see *Blueprint for a greener revolution* on pages 18-21 of *Rice Today* Vol. 10, No. 1). GRiSP is driven by three objectives that target increased rice productivity, fostering sustainable farming systems, and improving efficiency and equity of the rice sector. All of these are pursued under different themes of various sciences, and gender analysis particularly falls under "technology evaluations, targeting, and policy options for enhanced impact."

This simply says that for more efficient and rapid uptake of technologies to take place, farm-level data are further examined through the lens of gender analyses to identify the varying gender roles in rice farming, and to assess the effects of technologies on women farmers, as well as to enhance women's roles in ensuring food, health, and nutrition security, and poverty alleviation.

For more information on the Leadership Course for Asian and African Women, see http://asianwomenleaders.wordpress.com.

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What's cooking?

Ipoh Kway Teow

A simple but flavorful Malaysian rice noodle soup

CHRIS QUINTANA (3)

Patti Heong, spouse of Dr. K.L. Heong, a senior scientist at IRRI responsible for research on arthropod ecology and integrated pest management, often makes this simple but delicious soup for lunch or a snack.

Patti, who has been at IRRI since the Heong family arrived in 1989, was previously an executive secretary to a director at Tractors Malaysia. "Cooking has always been my hobby," she says. "I like to experiment with different recipes and tastes. With this dish, I am integrating Cantonese and Malaysian tastes."

"Ipoh Kway Teow Soup," she adds, "also known in Cantonese as *Yi Poh Sar Hor Fun*, can be found in most food courts and hawkers' haunts throughout major towns in Malaysia. It is served in clear soup and is like a comfort food—very light. This dish is named after Ipoh, the capital city of the state of Perak in my home country of Malaysia, since it is believed that the best *kway teow* (rice noodles) originated from that area."

Ingredients

- Rice noodles (substitute with rice-stick noodles if fresh noodles are not readily available): 50–60 grams
- 1 chicken breast (boiled and shredded)
- 2 large shrimp (pan-fried with shell on). When cooked, remove shell and slice prawns into halves, lengthwise
- ½ cup chives: wash, rinse, cut into 2-inch lengths, then dip them in boiling water to blanch
- ½ cup toge (mung bean sprouts): wash, rinse, then dip them in boiling water to blanch
- 2 tbsp fried shallots (native onion) for garnishing

Cooking directions

Boil the rice noodles or rice-stick noodles until al dente (i.e., firm but not soft like in pasta; not overcooked). Drain. Put the noodles in a bowl. Top with the cooked chicken, shrimp, chives, and toge. Ladle piping-hot chicken soup (or broth) over the noodles. Garnish with fried shallots. Accompany dish with freshly cut chilies mixed with soya sauce.

The broth can be made with chicken cubes or a chicken soup pack.

Enjoy!

Watch Ms. Heong demonstrate how to prepare the dish in a 3:44 video on YouTube at http://snipurl.com/rice-noodle_soup.

Kiping the faith

by Alaric Francis Santiaguel

IRRI

The incredible edible art of Lucban

In the Philippines, a country with 1,001 fiestas, town celebrations tend to become indistinguishable from one another. Brass marching bands, multicolored buntings, and dining tables on the verge of collapsing under the sheer weight of food are common denominators of town fiestas. But Lucban, a bustling yet quaint town in the province of Quezon, Philippines, has managed to elevate its fiesta into a cultural icon.

Every 15th of May, Lucban undergoes a fantastic transformation as its people celebrate the famous Pahiyas festival. It is an annual celebration, during which the townsfolk offer their heartfelt gratitude for the year's harvest to Saint Isidore (San Isidro Labrador), the patron saint of farmers.

The sowing and harvesting of rice as well as other agricultural crops have been the basic themes in Philippine folk rituals and artistic expressions since time immemorial. *Pahiyas* is a Filipino term that means precious offering and predates the Spanish colonial period of the country by several centuries. This celebration was originally an animistic ritual practiced by the pre-Christian Filipinos to honor their rice god, *Ampo't Paray*, and to ask for bountiful harvests in the coming year. Saint Isidore did not come into the picture until the 16th century through Spanish friars and missionaries who introduced Western and, in particular, Roman Catholic Christian values into the country's

A KALEIDOSCOPE of faith and creativity. The celebration of the *Pahiyas* festival engulfs Lucban, Quezon, in vivid colors of kiping wafers used as decorations. At the center of this annual activity is Saint Isidore, the beloved patron saint of farmers (*above right*).

cultural and religious practices. The festival itself, however, retained its original core of thanksgiving and prayers for more abundant harvests to come.

Coincidentally, when St. Isidore was introduced to the local people, bigger harvests overwhelmed the town, which then boosted the saint's popularity—not to mention convincing more people to convert to the Roman Catholic religion. In fact, the bumper crop grew with time until the church of Lucban, where the harvests were stored as offerings to the saint, could no longer accommodate them. As an alternative, farmers displayed their harvests in front of their houses so that the priest could bless them as he made his way around town during the annual procession. Through the years, this practice turned into a contest of creativity as households tried to outdo each other and the offerings evolved into eye-catching decorations.

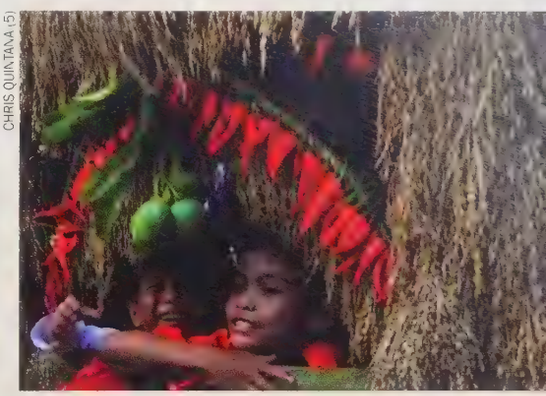
Hence, homes—from the most humble to the more affluent—that would otherwise be nondescript on ordinary days are dressed up in full fiesta glory using fruits, vegetables, rice panicles and straws, flowers, pandan leaves, and ferns, but mostly kiping.

Kiping is a leaf-shaped wafer made of rice dough and vividly dyed with food coloring. Kiping wafers are entirely edible and are usually deep fried in small pieces or cooked whole over charcoal. Kiping is best eaten with some sugar because it is not the most flavorful food in the world.

However, what kiping wafers lack in palatability, they more than make up for in visual creativity. They are strung together to form lanterns, multitiered chandeliers, and gigantic butterflies and flowers. The visual effect is truly astounding, and, during the three-day celebration, Lucban is awash in colors that match the intensity of the people's devotion to their patron saint and their passion for their centuries-old tradition.

Notably, although Pahiyas is largely a religious occasion, it inspired the Philippine government, under President Gloria Macapagal-Arroyo, to launch in 2004 the Panagyaman (Thanksgiving) Rice Festival to pay tribute to the farmers and to highlight the significance of rice to every Filipino household. Rice farmers play the most important role in national food security as they serve as the country's backbone in the national campaign for a hunger-free Philippines. April now marks the rice festival month as it ushers in the harvest season for rice.

See how to make kiping wafers on YouTube at http://snipurl.com/kiping.



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M.N. BUDHAR (2)

Farmers get their groove back

by M.N. Budhar

Drum seeding finds its way back to Tamil Nadu as farmers learn how to control weeds effectively and maximize profits using the technology

MR. CHAKRAVATHY decided to use a drum seeder this year to sow his new crop.

Consumers in Tamil Nadu, a predominantly rice-growing state in India, who preferred millet grains, particularly finger millet, for hundreds of years, have shifted to rice because it is considered a status symbol.

Rice is important and will continue to play a vital role in food security for millions of people in India. The future of Indian food security and foreign exchange through rice exports will also largely depend on desired production and productivity. Opportunities are great for attaining high yield in rice through proper agronomic management practices, low-cost mechanization in seeding and weeding, and suitable establishment techniques. The need for increased food production at prices affordable to consumers and profitable to farmers has been a concern for all.

Tamil Nadu has been recently dominated by the industrial sector compared with other states. Rice is grown in all of Tamil Nadu's 30 districts comprising a total rice area of 2.05 million hectares. For example, in Dharmapuri and Krishnagiri districts, located in the northwestern agroclimatic zone of Tamil Nadu (see map), rice is the staple food crop. It is cultivated on 65,000 hectares in spite of a lack of water and labor resources, the high cost of cultivation, and less profitability. These two districts are situated near industrial cities, which lure farm laborers with high wages and stipulated work hours.

Industrialization led to increased labor migration to city areas and a shift toward alternative rural employment, and caused a severe farm labor shortage. Consequently, it also increased the cost of labor during peak farming operations such as transplanting, weeding, and harvesting.

In Tamil Nadu, transplanting is traditionally done only by women. The task is labor-intensive and cumbersome. The major farm activities such as preparing and managing the nursery, pulling out seedlings, transporting and distributing them to the main field, and transplanting them consume 25–30% of the total cost of cultivation in transplanted rice. Moreover, expansion of irrigated area, the availability of short-duration high-yielding rice varieties, availability of herbicides to control weeds, increased transplanting costs, and declining profitability of rice production have forced many farmers to shift from transplanting to direct seeding on puddled and leveled soils under irrigated conditions. For this, a drum seeder, a wetland implement, greatly helps the rice-farming community by directly sowing germinated rice seeds, in lines, in the field.

The drum-seeding concept was first developed and tested by the International Rice Research Institute (IRRI) and its plastic version was developed by Cantho Plastics in Vietnam. Its prototype

DR. G. UMAPATHY

A YOUNG farmer demonstrates the use of a plastic drum seeder.

model was refined by the Tamil Nadu Agricultural University (TNAU) in Coimbatore, India. The Regional Agroindustrial Development Cooperative Kerala Ltd. (RAIDCO), in India, is the authorized manufacturer of the drum seeder prescribed by TNAU.

The plastic drum seeder consists of four drums—each can hold 2 kilograms of seeds at a time. This eight-row drum seeder requires only 9 kilograms of pulling force to operate. Without the seed, the machine weighs 8 kilograms. And, it requires two persons to cover 1 hectare and costs about US$88 for each unit.

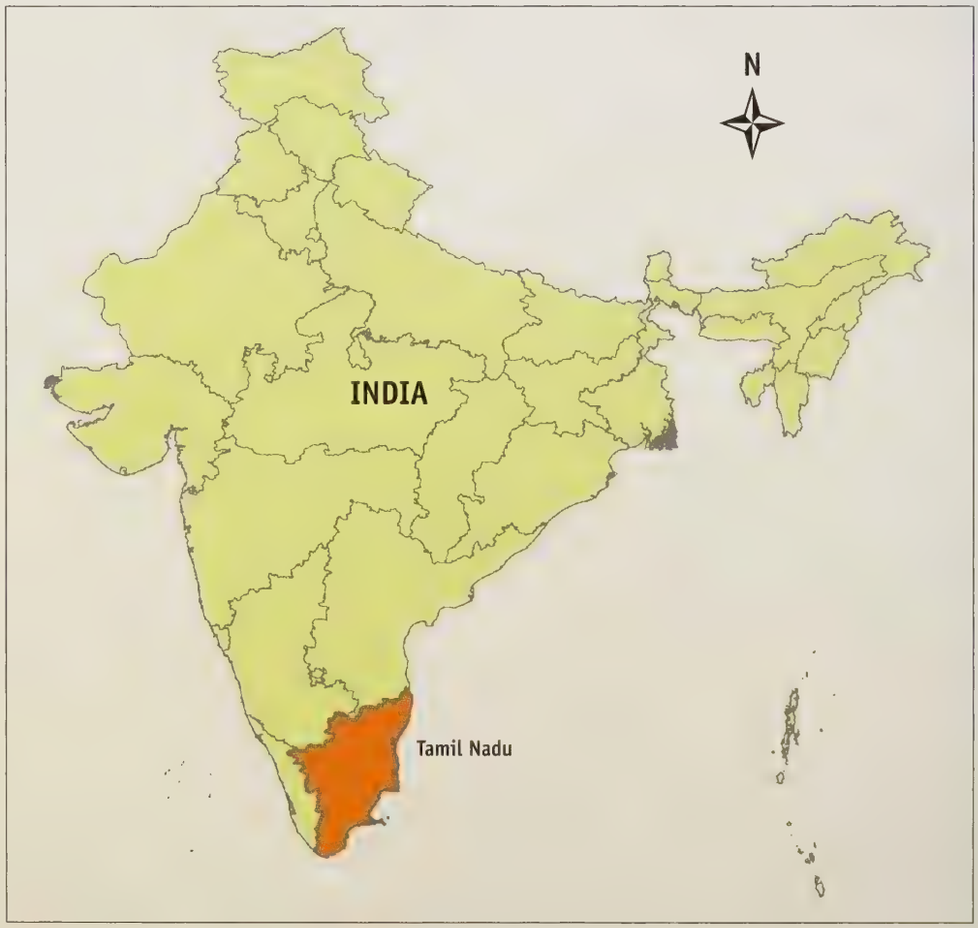
The use of drum seeding in sowing of sprouted seeds in puddled fields has already been proven successful in many countries such as Thailand, Vietnam (see *Drumming up success* on pages 22-27 of *Rice Today* Vol. 4, No. 2), Myanmar (see *Drum seeders pick up the beat in Myanmar* on page 3 of *Ripple* Vol. 3, No. 2), Bangladesh (see *The direct approach* on pages 12-18 of *Rice Today* Vol. 5, No. 2), and the Indo-Gangetic Plains of India (*Direct seeding of rice gets warm approval in the Indo-Gangetic Plain* on page 11 of *Ripple* Vol. 1, No. 2). Farmers in Tamil Nadu have also accepted the drum-seeding technology because it cuts labor and seed costs, speeds up the planting process, provides higher yields, or at least yields similar to those of transplanted rice, and is easy to operate. In other words, farmers profit more.

Field experiments at the TNAU Regional Research Station (RRS) in Paiyur and on-farm trials conducted in villages of Krishnagiri District compared traditional transplanted rice with direct-seeded rice through drum seeding in 2000. Even then, the results indicated that drum seeding had a higher or equivalent yield advantage compared with transplanting. Plus, it reduced crop duration by 7–10 days.

Watch out for the weeds

Although farmers had been quick to adopt drum seeding, they forgot to control weeds—either manually or chemically—during the early stage of crop growth despite the recommendation of researchers and extension workers. Consequently, weeds invaded the crop and reduced yields drastically. Farmers also had to shell out extra money to remove the weeds. Because of this, the drum-seeding technology was perceived as no longer viable.

Reportedly, weeds can reduce yields by as much as 50–60% in direct-seeded rice. To prevent this loss, early control of



Gains in drum seeding

P. Gunasekaran, a small farmer in Annamaaipatti village in Dharmapuri District and a regular visitor to RRS in Paiyur, witnessed the success of a 2-year experiment on drum seeding combined with weed control methods versus transplanting practices. He adopted drum seeding and mechanical weeding technology in his 0.4-hectare field. He and his wife did the sowing, weeding, and spraying. Only for harvesting and threshing did he hire some labor. He proudly said that his crop yielded 40 bags (each bag weighs 75 kilograms) of moist-free rough rice—an amount never yet recorded in his rice-farming experience. Besides this record yield of 7.5 tons per hectare, he could reduce cultivation expenses to a tune of US$76—which came from the time saved in nursery establishment and management, lower seed requirement (from 30 kilograms to only 10 kilograms of seed), less labor cost for transplanting, and less manual weeding cost. Most of all, he felt happy just being relieved of the drudgery in putting up a nursery and managing it and transplanting along with laborers. Satisfied with the technology, he encouraged other farmers to adopt this technology.

Another beneficiary of RRS is G. Ekambaram, a progressive rice farmer and rice mill owner, who has adopted the latest technologies in rice cultivation for the past 3 decades in Pothapuram village near Kaveripattinam town in Krishnagiri District. RRS scientists usually conduct on-farm trials first in Mr. Ekambaram's field for easy technology dissemination. His paddy farm is situated in a rice belt where labor is scarce and costly and transplanting of seedlings is seldom done at the right time. This forced him to adopt drum-seeding technology. The first time he tried this technology with chemical control of weeds was during the dry season of 2000 in a smaller patch of 0.14 hectare. However, the preemergence herbicide applied at 8 DAS did not control many weeds, which caused damage to the crop. So, he decided to apply herbicide with safener, which is a substance applied to reduce the effect of the herbicide on crop plants. In the wet season of 2000 and 2002, he extended this technology to his entire farm of one and a half hectares. The drum seeder combined with chemical control of weeds increased the net income of his rice crop by reducing the cost of cultivation. In 2003 to 2006, because of a water shortage, nonavailability of herbicide and safener, and a lack of finances, he was not able to cultivate rice.

FARMER P. Gunasekaran hopes to revive his farm with the help of drum seeding.

During the wet season of 2007, he sowed his crop using a drum seeder and adding mechanical weeding in his agronomic practices. It was then that he was able to harvest a good yield and gain a higher profit. Satisfied with the benefits derived from the drum-seeding technology, he spread the news to other farmers. He encouraged them to use mechanical weeders at the right time.

weeds is imperative. Although manual weeding can control weeds effectively, it is difficult, time-consuming, and costly—especially when labor resources are not readily available.

In the past, farmers failed to shift from transplanting to direct seeding effectively because they lacked knowledge of weed management using herbicides. Fear of handling herbicides, lack of skill in spraying, lack of knowledge in using an optimum dose, and unavailability of wide-spectrum herbicide to control diverse weed flora prevented the success of drum-seeding technology.

Revival of drum-seeding technology

The key to successful direct seeding on a large scale lies in the way farmers manage their weeds and crops. Thus, to revive the drum-seeding technology and to respond to the needs of farmers, experiments were once again conducted in the Paiyur RRS. A study investigated the effect of initial weeding, weeding interval, and frequency of weeding by mechanically using a cono weeder and compared it with chemical and manual weeding control in direct- or drum-seeded puddled rice.

A study conducted in 2007 showed that mechanical weeding and soil stirring done at 10 days after sowing (DAS) and subsequent weeding and stirring done twice at an interval of 15 days were able to control weeds effectively and had maximized productivity and profitability in a drum-seeded field.

During that time, even while the experiment was in progress, many farmers visited the experimental field and saw the success of the direct-seeded crop. P. Gunasekaran, a farmer who lives 50 kilometers away from the experimental station, became interested in the technology and adopted it on his small farm (see box for more on his success story). With the support of RRS, he and his relatives were able to cultivate a direct-seeded crop using a drum seeder on half a hectare of his land. Many farmers witnessed the practices adopted by Mr. Gunasekaran and his relatives as well as the progress of his crop. Hence, other farmers became interested also. They were then advised by the RRS scientists to use mechanical weeding and stir the soil at appropriate stages using a cono weeder, which resulted in vigorous crop growth and good yield. Later on, to celebrate their successes, the farmers themselves organized a field day to share the technology with other farmers in the area.

Through field days, more and more farmers adopted drum-seeding technology. Because of the benefits such as a lower seed rate, no nursery, no transplanting, no hand weeding, and less field duration, the drum-seeding technology regained the confidence of the farmers. The National Bank for Agriculture and Rural Development in Chennai shares this confidence in the technology by collaborating with RRS in Paiyur to carry out a scheme for 2010-11, *Drum seeding and mechanical weeding for productivity, profitability, and prosperity of rice farmers* under a Farmers' Technology Transfer Fund with a budget outlay of $13,890 in 10 agricultural blocks of Krishnagiri District in Tamil Nadu. The scheme provided financial support to conduct 20 farmers' field demonstrations to compare drum seeding with traditional transplanting and to provide training to 500 farmers. A drum seeder and cono weeders have been distributed for free to all farmers' organizations for hands-on trials in the hope that more farmers will benefit from this simple yet effective technology.

Dr. Budhar is professor of agronomy at the Regional Research Station, Tamil Nadu Agricultural University, India.

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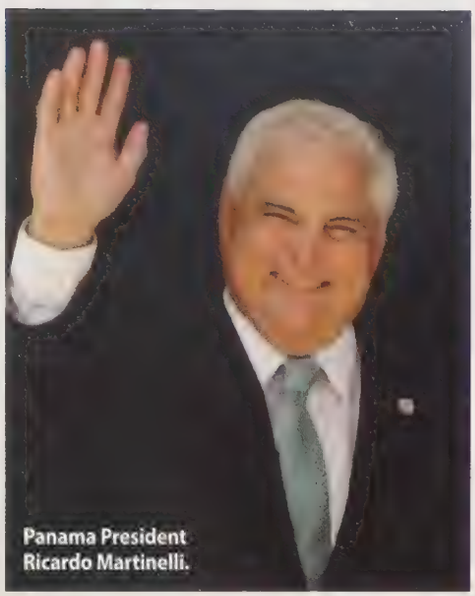
TRT Rice Americas Conference 2011


Panama President Ricardo Martinelli.

Hotel Riu Plaza Panama

The Rice Trader (TRT) is pleased to announce the 5th annual TRT Rice Americas Conference 2011, which will be held in Panama City on 7-9 June at the Hotel Riu Plaza Panama. The conference will feature prestigious speakers, cutting-edge information and insights into what the future holds for the rice industry, as well as excellent networking opportunities.

With a record attendance in Cartagena (in 2010), TRT Rice Americas 2011 is expected to continue to grow with business interest and further establish a ground for rice industry members to build their network among the most comprehensive group of delegates representing "The Americas."

Featuring a who's-who lineup of speakers as well as some of the world's top analysts, the TRT team will present a considerable amount of analysis that will help delegates expand their understanding of the rice business beyond regional limitations.

Panama's President Ricardo Martinelli and Minister of Agriculture Emilio Kieswetter are among the high officials to grace the event. Leading the panel of speakers are Jeremy Zwinger, TRT president and CEO, and Dwight Roberts, CEO of the U.S. Rice Producers Association. Other experts that make up the panel are Phyllis Powers, U.S. ambassador to Panama; Dr. S. Elwynn Taylor, extension agronomist from Iowa State University; Dr. Bill Wilson, professor from North Dakota State University; Dr. Steve Linscombe, director of the Louisiana State University Agriculture Center; Dr. Bruno Lanfranco, senior researcher from the National Agricultural Research Institute of Uruguay; and many more.

Furthermore, the following key issues will be tackled at the conference:

- The world rice market: Will the global cereals situation leave its mark on rice?
- Currency movements and how they have affected origins and destinations.
- Climate change and its impact on food security: What can we expect in 2011? La Niña?
- Can South American exports remain competitive? How will Brazil's recovery in production affect Latin American rice trade?
- How do Central and South American rice players deal with these changes? Is it a return to normalcy?
- Will South American exports recover or will La Niña dampen hopes?
- How will the U.S. deal with an inventory problem that also has quality issues? What are the prospects for U.S. rice production when other commodity prices rise and look more attractive in the eyes of farmers?
- Food security and the security of supply: the latest in innovation, and the research foundations that provide the backdrop to food security efforts.
- What do buyers think? What are the concerns of buyers?

KAREN BEARB (4)

Bred from Louisi

The development of rice varieties helps guarantee sustainable rice production in the state of Louisiana and elsewhere in the United States. Variety development is one of the missions of the Louisiana State University Agricultural Center (LSU AgCenter) Rice Research Station near Crowley, Louisiana.

To develop a new variety, the first step is to generate new genotypes (or genetic combinations) by crossing two different rice lines. More than 1,000 crosses are typically made at the Rice Research Station each year. The resulting seed—F_1 or first generation—from these crosses will contain genetic information from both parents. This seed is then germinated to produce F_1 plants. The seeds from these plants are planted during the next season to produce a population of segregating F_2 plants, which display numerous combinations of traits from the two parents. Then, these plants undergo an important step of selection, in which breeders pick individual panicles that exhibit the best combination of critical traits.

From this point on (F_3 to F_n), most of the breeding materials are grown as panicle (head) rows. A panicle row is a row of plants that all come from a seed taken off a single panicle produced from the previous generation. The best rows (not individual plants) will be selected to advance to the next generation. Each year, 95,000 to 110,000 panicle rows are grown at the Rice Research Station in various breeding projects. Each of these rows is a different genotype and, theoretically, any of them could become a new variety.

From the F_4 to F_5 generation, lines from most of the crosses are already sufficiently uniform so their initial yields can be evaluated. Lines selected for potential yield evaluation are bulk-harvested.

During the following winter, each harvested sample is analyzed (for grain appearance and milling, cereal chemistry, and seedling vigor), and the superior lines go through preliminary yield tests. These trials are planted in late March and early April at the Rice Research Station. This allows a sufficient growing season to evaluate first- and ratoon-crop performance.

A regional endeavor

Lines with superior characteristics in preliminary testing are considered for commercial-advanced (CA) trials and a Uniform Regional Rice Nursery (URN). The CA trials are conducted at six to eight locations across Louisiana's rice-growing regions. Meanwhile, the URN is a cooperative endeavor among the public rice breeding programs in Arkansas, Louisiana, Mississippi, Missouri, and Texas. The nursery is a yield-testing program conducted at the primary research location in each of those states. The same rice lines are tested at each of the five locations. The 200 entries in these tests are elite lines from each breeding program that the breeders think might have the attributes worthy of a new release. Each of the breeding programs contributes a number of lines to the testing program. The yield test is conducted at the research station in each state using the best management practices for that region, and current commercial varieties are included to provide a benchmark for comparison.

Lines that show good and stable yield, milling, and agronomic characteristics across all these diverse environments will be re-entered into these trials in the following year. A line that shows good potential as a future release will also be included in the statewide testing program to determine optimum nitrogen fertilization rates. In addition, these lines will be evaluated based on their responses to selected rice herbicides so that, if a line is released as a variety, a package of agronomic recommendations for its production can also be made available.

If a line displays significantly better performance than the current commercial varieties, seed increase will be expedited. The initial seed increase will be in headrow blocks that will be used to plant a breeder seed block. Seed from the breeder seed block will provide enough seed for up to a 20-acre (about 8 hectares) foundation seed field on the Rice Research Station. Foundation seed is then provided to the industry as the first step in the dissemination of a new variety.

STEVE LINSCOMBE

...na

by **Steve Linscombe** and **Xueyan Sha**

The LSU AgCenter Rice Research Station continues to develop new varieties to sustain rice production and supply in the U.S.

Rice varieties

The two primary types of grain grown in Louisiana are long grain and medium grain. Long grains are characterized by a grain length-to-width ratio of more than 3:1 and they typically cook dry and fluffy because of a high to intermediate gelatinization temperature and they have relatively high amylose content. Medium grains typically have a length-to-width ratio of 2:1 to 3:1 (usually closer to 3:1) and they cook soft and sticky because of a low gelatinization temperature and relatively low amylose content.

In recent years, a majority of the southern U.S. has been planted to Clearfield varieties and hybrids. Therefore, much of the breeding effort in the program focuses on improving lines with this trait in both long- and medium-grain types.

Interest in special-purpose varieties has also increased in recent years. These varieties have distinctly different attributes, such as aroma, elongation, or unique cooking characteristics, favored by many ethnic populations living in the U.S. as well as by other consumers interested in gourmet or premium rice. The major specialty types are soft-cooking, aromatic Jasmine; flaky-cooking, elongating, and aromatic Basmati; Kokuho; waxy, standard long-grain aromatic Della; soft-cooking, nonaromatic Toro; and other lesser-known gourmet types. Most specialty rice marketed in the U.S. is imported from Thailand, India, and Pakistan. A number of specialty varieties from the Della, Toro, and Jasmine groups are under limited production in the southern U.S., but the recent releases of Jazzman and Jazzman-2 have greatly expanded the area of specialty varieties.

In the past 15 years, more than 60% of the rice area in the southern U.S. has been planted to varieties developed at the LSU AgCenter Rice Research Station (see table). This includes conventional and Clearfield long and medium grains, as well as specialty types.

Dr. Linscombe is a senior rice breeder and director of the Louisiana State University Agricultural Center and Dr. Sha is a rice breeder and associate professor at the center.

Rice varieties released from the LSU AgCenter Rice Research Station since 1991.

Variety name	Grain type	Release year	Breeders
Lacassine	Long	1991	Linscombe, Jodari
Bengal	Medium	1992	Linscombe, Jodari
Cypress	Long	1992	Linscombe, Jodari
Jodon	Long	1994	Linscombe, Jodari
Dellrose	Long (A)*	1995	Jodari, Linscombe
Lafitte	Medium	1996	Linscombe, Jodari
Cocodrie	Long	1998	Linscombe
Dellmati	Long (A)	1999	Jodari, Linscombe
Earl	Medium	2000	Linscombe
CL121	Long	2001	Linscombe, Sha
CL141	Long	2001	Linscombe, Sha
CL161	Long	2002	Linscombe, Sha
Cheniere	Long	2003	Linscombe, Sha
Pirogue	Short	2003	Linscombe, Sha
Ecrevisse	Short	2004	Linscombe, Sha
CL131	Long	2005	Linscombe, Sha
Jupiter	Medium	2005	Sha, Linscombe
Trenasse	Long	2005	Linscombe, Sha
CL151	Long	2008	Linscombe, Sha, Blanche
Catahoula	Long	2008	Linscombe, Sha, Blanche
Neptune	Medium	2008	Sha, Linscombe
Jazzman	Long (A)	2009	Sha, Linscombe
CL111	Long	2010	Linscombe, Sha
CL261	Medium	2010	Linscombe, Sha
CL152	Long	2011	Linscombe, Sha
Caffey	Medium	2011	Blanche, Linscombe, Sha
Jazzman-2	Long (A)	2011	Sha, Linscombe

*A stands for aromatic.

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Hidden Treasure*

On this restful Saturday, while I ruminate on this writing, I am struck by the thought of how daily life has grown more complicated now than when I was younger. Perhaps, it comes with the change of perspective as time moves forward. Or, it could be that life simply does become more complicated as we grow and volatility is but the nature of the world. With five children—all under the age of 8—I believe my life could only become more complex. Nevertheless, my hope for a more perfect world for the generations to come endures.

In a truly perfect world, all dreams and hopes come true. Through focus and determination, one can overcome the many complexities and challenges in life. At the same time, the needs of the world are well taken care of as peace reigns day and night. The God-given intellect of man is used for the advancement and sustainability of society. Essentially, in this world, things are more complete, yet simple for all.

To live in a well-intended but imperfect reality, then, makes the push for the proverbial perfection crucial toward achieving what is ideal—although at times, one loses track of what is real.

The reality of today is that volatility is the name of the game, and perhaps (just perhaps) the current global situation is creating a sense of déjà vu—that the "2008 food crisis" is building up again. Like in 2007 and 2008, the media's increased attention to food security issues today, combined with the social changes happening in the world, particularly in some parts of Africa and the Middle East, clearly reflects the strange parallelisms. The only difference from 3 years ago is that the issues now seem more real on both the political and food side of the equation. In addition, the dollar continues to show that it could go still lower (somewhat, in parallel to a few years ago), further fueling volatility in the market. And, with the U.S. national debt expected to hit US$15 trillion, more inflationary problems are bound to arise.

Interestingly, however, in spite of all this, rice prices have shown a rather strong resistance to price increases, and remain lower than the prices of other items in the overall food complex.

Many players continue to indicate that they stand bearish to flat in the short run of 3–4 months, but feel quite excited about the market as it moves toward the end of the second quarter (1 July 2011).

In relation to this, as of this writing, the spread between rice and the major grains is expected to come into play and affect decisions on planting, as well as the direction in which commodities will flow. The truth of the matter is, the spread of wheat and corn (maize) to rice is back at levels that have not been seen since 2007. And all of this, when taken together, is affecting the overall commodity balance as we move closer to the planting time in the U.S. and other major crop-producing areas in the Northern Hemisphere, and as growers feel the pressure to decide on which crop to plant this year. To put things into perspective, the upcoming U.S. rice crop looks off by 20% as soybeans have become a much better option, especially given the high fuel and fertilizer costs. Cotton is also bound to occupy more area, and surely the high price of sugar will also put sugarcane high on the list of crops to plant.

In this context, one could say that rice has become the "follower" in the overall food complex, when just a few years ago it led the charge. With this in mind, perhaps this is the time to be neither bearish nor bullish, but to be extremely observant of what is happening in the rice market and all the other related markets. In the end, the simple reality is that, in times of peace or instability, food must be available and must be distributed throughout the globe. Although we may not achieve a "perfect world" in this endeavor, what is more important is the focus to solve the problems in feeding the world.

On 7-9 June 2011, The Rice Trader will hold the 5th TRT Rice Americas in Panama City, Panama. Once again, this conference promises to gather the brightest minds in the rice industry and offer the best opportunities to network and better understand the ever-shifting dynamics of the market to help everyone make more informed decisions in their business and avoid risks. President Ricardo Martinelli of the Republic of Panama will be gracing the event, along with many other key influential people in the industry. We invite you all to the conference and to this social gathering for some fun and networking.

Jeremy Zwinger

Jeremy Zwinger
Publisher

* The opinions expressed here are those of the author and do not necessarily reflect the views of the International Rice Research Institute.

Remembering four GIANTS in agriculture and development

by **Gene Hettel**

Thomas Hargrove, Robert Huggan, Dao The Tuan, and Michael Way—four giants in the world of agriculture and development—were lost to us all within a 28-day period in January-February 2011. Respectively, two were cutting-edge international agricultural communicators, one a professor-agriculturalist-scientist in his home country of Vietnam, and one an international champion of integrated pest management (IPM). In their respective disciplines, all had important ties to rice at various times in their careers.

The two communicators had a profound influence on my own life and career. Tom Hargrove, long-time editor and head of the International Rice Research Institute's (IRRI) Communication and Publications Services (CPS; 1973-91), brought me from Iowa State University to IRRI in 1982-83 as a visiting editor. During this time, he introduced me—up to then, I was still a Midwestern U.S. farm boy who had never seen rice growing in the field—to the worldwide importance of this staple grain and the overall significance of agricultural communication.

Bob Huggan, Tom's successor as head of both IRRI's Information Center and CPS (1993-97) and a senior advisor in public relations (1997-98), brought me back to IRRI in 1995 for a longer stay—now 16 years and counting—during which time I've made an attempt to fill the shoes of these two prolific and often larger-than-life personalities who preceded me.

Tom Hargrove—international agriculturalist, author, and adventurer

Tom, 66, passed away unexpectedly on 23 January in his native Texas. He was a mentor, colleague, and friend to many, not only at IRRI but also at the International Center for Tropical Agriculture in Colombia, the International Fertilizer Development Center (IFDC) in the United States, and many other places around the world. He was an amazingly creative writer and editor. He turned his 1994-95 harrowing experience as a kidnap victim

IRRI (4)

of FARC (Revolutionary Armed Forces of Colombia, in English) guerrillas in the Colombian mountains into a best-selling book, *Long March to Freedom* (http://snipurl.com/march_to_freedom), which was a source for the Hollywood movie *Proof of Life* (http://snipurl.com/proof_of_life).

He served in the U.S. Army during the Vietnam War, bringing along IRRI's Green Revolution rice variety, IR8. He wrote much about this particular experience in his book *A Dragon Lives Forever: War and Rice in Vietnam's Mekong Delta* (http://snipurl.com/dragon_war_rice), and in two subsequent feature articles in *Rice Today* (see *Breeding history on pages 34-38 at http://snipurl.com/breeding-history* and *I remember Honda rice* on pages 39-44 at http://snipurl.com/honda-rice in Vol. 5, No. 4).

During his 18 years at IRRI, he had an intimate connection with the scientists, pictured above at right with World Food Prize Laureate and Principal Scientist Gurdev Khush in the 1980s. Indeed, Tom conducted and published his own rice research on the use of cross analysis to predict the genetic composition of improved rice varieties.

On the communications front, he pioneered innovative designs, procedures, and policies for multilanguage publication in agriculture, and conducted workshops on promoting the concept. As a result, hundreds of thousands of IRRI-promoted pocket field guides have been produced for farmers and extensionists to read and use in their native languages. For example, between 1983 and 2010, *Field problems of tropical rice* (http://snipurl.com/field-problems) has had 12 printings in English and numerous other languages, numbering more than 405,000 total copies. The co-publication effort also included the phenomenally popular *A Farmer's Primer on Growing Rice* (http://snipurl.com/farmers_primer), of which 48 editions have been published in 40 languages in more than 20 countries, making it among the world's most widely published agricultural books.

Ed Price, director of the Borlaug Institute and associate vice chancellor at Texas A&M University, and long-time colleague and friend, points out that Tom was also an adventurer. "He scuba-dived for the lost Philippine town of Taal and helped restore bean cultivars in Rwanda after the genocide there," said Dr. Price. "His miraculous survival of 11 months' captivity by the FARC guerrillas in Colombia must have called upon formidable strengths that none of us can fathom or understand. Tom was larger than life, and thus he remains with us."

View an excerpt from my IRRI pioneer interview with Tom on 21 June 2008 at http://snipurl.com/hargrove1 and read more about him in a 24 January 2011 article in the *Houston Chronicle* at http://snipurl.com/hargrove2.

Bob Huggan—communicator with a human touch

Bob, 79, passed away on 15 February in Montpellier, France, after a lengthy illness. He was an expert in public awareness, donor relations, appropriate dissemination of scientific research results, research and development communication, cross-cultural communications, and information management.

A Canadian, Bob had previously served as associate editor (public affairs) and deputy director, Communications Division, International Development Research Centre, Canada (1980-87); director of information and communications, World Agroforestry Center, Nairobi, Kenya (1987-90); and head of information and communication, International Network for the Improvement of Banana and Plantain, Montpellier,

France (1990-93). He was also a visiting professor, Institute of Development Communication, University of the Philippines, Los Baños (UPLB, 1993-98).

He was an inspirational teacher and communication strategist in the agriculture and development arena and a colleague and friend to many throughout the world. In addition to being a strategist, he was a hands-on person who relished opportunities to mingle with visitors to IRRI, explaining to them the latest Institute innovations, such as the new rice plant type, as shown in the mid-1990s photo below.

IRRI Director General Robert Zeigler, a staff plant pathologist at IRRI when Bob was here in the mid-1990s, writes: "Bob came in to fill Tom's enormous shoes and did so in a way that both charmed and reassured. He also inspired and put us on the right track that has served us well. Bob's vision about what quality communications meant, his understanding that our targets were not just scientists, but everyday folks, and his seeing long before the rest of us that the Internet would grow into a powerful vehicle for IRRI have earned him a special place in IRRI history."

Paul Mundy, a development communication specialist based in Germany, writes: "I first met Bob when he was at IRRI and I was at the International Institute for Rural Reconstruction. Together with the International Center for Living Aquatic Resources Management, then based in Manila (now the WorldFish Center in Malaysia), we organized an occasional get-together of our communication departments. Like a true communication professional, Bob was very willing to spend time sharing the IRRI communication unit's latest initiatives. But, unlike so many professionals, he really cared—not only about getting his message across but also about the people he was talking to."

See more tributes to Bob Huggan at http://snipurl.com/huggan.

Prof. Dao The Tuan—professor, academician, administrator, and rice breeder

Prof. Tuan, 79, passed away unexpectedly on 19 January in Hanoi. He was the former director of the Vietnam Academy of Agricultural Sciences (VAAS; www.vaas.org.vn) and had strong partnership ties to IRRI throughout the Institute's long and fruitful relationship with Vietnam.

Just last November, during the International Rice Congress (IRC), he was a "whirlwind" of activity, meeting with numerous participants during the 3-day event. He is pictured above at right consulting with Dr. Zeigler during a Congress session break.

I sat next to him during the opening session of the Congress and he relayed to me how happy he was that his home country was hosting the 3rd IRC, with the largest attendance ever for such an event.

During his funeral on 22 January, Cao Duc Phat, Vietnamese minister of agriculture and rural development, said: "We lost a great scientist who always contributed frank opinions that were full of wisdom. Colleagues lost a big brother, students lost a dedicated teacher who cherished them, and the farmers lost a great friend."

Prof. Tuan was known as the "father" of many highly productive rice varieties in Vietnam and he built a scientific foundation for intensive rice cultivation that garnered yields as high as 10 tons per hectare as early as the 1970s, which is explained in his book *High-yield rice physiology*. His research was applied widely, paving the way for the Green Revolution in Vietnam.

See more on Prof. Tuan at http://snipurl.com/the_tuan.

Michael James Way—entomologist and IPM champion

Professor Way, 89, passed away in England on 18 January after a short illness. The world lost a great man and an IPM champion who devoted most of his life's work to developing IPM methods

to rationalize and reduce insecticide use, mentoring students, and helping and nurturing scientists in developing countries. He had served on the FAO Panel of Experts on Integrated Pest Control and participated in numerous missions to develop IPM in Asia and Africa.

Professor Way was an inspiration to many entomologists throughout the world, especially those involved in IPM. His contributions to ecologically based insect management are enormous and far ranging.

According to IRRI senior scientist K.L. Heong, from 1992 to 1999, Professor Way, then retired, was an occasional consultant/visiting scientist at IRRI. "He spent 3 months a year away from the UK winter to wade through hot and muddy rice fields in Victoria, Laguna, Philippines. He worked with me to understand the role of bunds in the rice ecosystem."

During that period, Professor Way, with Dr. Heong, produced the classic 1994 paper in the *Bulletin of Entomological Research* on the *Role of biodiversity in the dynamics and management of insect pests of tropical irrigated rice* (http://snipurl.com/biodiversity_role). "This work and the ideas it developed have formed the scientific foundations of the ecological engineering approach that is now promoted in IPM," concludes Dr. Heong.

To view Dr. Heong's full tribute to Prof. Way, see http://snipurl.com/michael_way.

A sleepy rice market: the calm before the storm?

by **Samarendu Mohanty**

Global food prices are on the rise again. In January, the food price index (see Fig. 1) exceeded the level witnessed during the peak of the 2008 food crisis when rice prices nearly tripled. The second food crisis in 3 years has led to riots and protests in many developing countries and has raised a serious question among many whether cheap food has become a thing of the past. It is also worthwhile to note that the International Monetary Fund food price index had been on the rise long before the 2007-08 spike, and, in the last 10 years, the index has nearly doubled even without taking into account both the 2007-08 and the 2010 spikes. Many of those who brushed aside the 2008 food crisis as a one-off event primarily driven by commodity speculation and panic among major rice-growing countries have started looking at the severity of future global food insecurity.

Unlike in 2008, when rice significantly contributed to the food crisis, the current crisis has been the handiwork of many other commodities such as wheat, maize (corn), soybeans, and sugar, as well as fruits and vegetables. So far, rice prices have remained relatively stable, with only a 17% rise between June 2010 and February 2011 compared with the prices of other field crops that have gone up by approximately 50–150% (see Fig. 2). Among the major cereals, the wheat price more than doubled and the maize price increased by more than 90% during this period. The prices of other field crops such as sugar and cotton have also witnessed a significant rise in prices, with an 80% and 150% increase, respectively, during this period. The main reason behind the hefty rise in prices of these commodities can be traced back to supply losses brought about by the extreme weather conditions in different parts of the world.

Between May 2010 and February 2011, global grain production was revised downward by 81 million tons because of bad weather in the major growing regions (see Fig. 3). For example, severe droughts in Russia, Ukraine, and Kazakhstan, and floods in Canada and Australia, have significantly lowered global wheat production this year by more than 35 million tons relative to what was produced last year. Although rice production for 2010-11 has decreased by 10 million tons from what was expected early in the season because of floods in Pakistan and in some Southeast Asian countries, still, global production for 2010-11 is estimated to be slightly above 450 million tons, that is, 11 million tons higher than the previous year's production.

The rising demand for grains—for both food and fuel—has also put additional upward pressure on food prices. For example, the share of maize used for ethanol production in the U.S. now accounts for nearly 40% of total production. This means that 125 million tons of maize are now diverted from food to fuel. Meanwhile, the consumption of food grains (wheat and rice) has been strong, with a 72-million-ton increase from 2005 to 2010 as compared with the 33-million-ton increase seen from 2000 to 2005.

The recent rise in food prices would have been higher had countries failed to rebuild their grain inventory in the last few years. Since 2008, wheat stocks have increased by more than 63 million tons, rising from 134 million tons in 2008 to 197 million tons in 2010 (Production, Supply, and Distribution online database, USDA). Similarly, rice stocks have also grown during this period, gaining 20 million tons more in 2010 compared with 2008 (PSD online database, USDA). This has definitely provided some support for grain prices during this tight production situation.

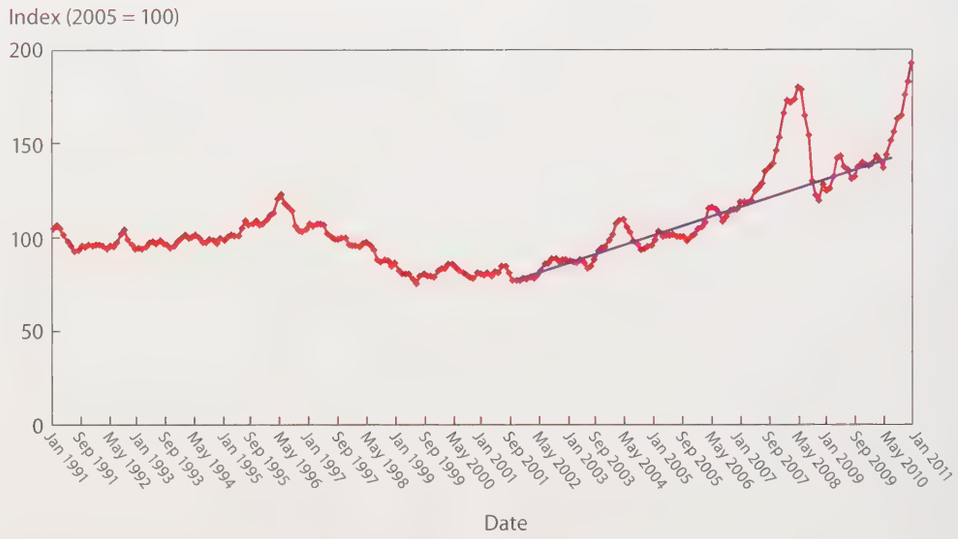

Fig. 1. IMF food price index (January 1991 to February 2011).
Source of raw data: International Financial Statistics, International Monetary Fund (IMF), and www.indexmundi.com.

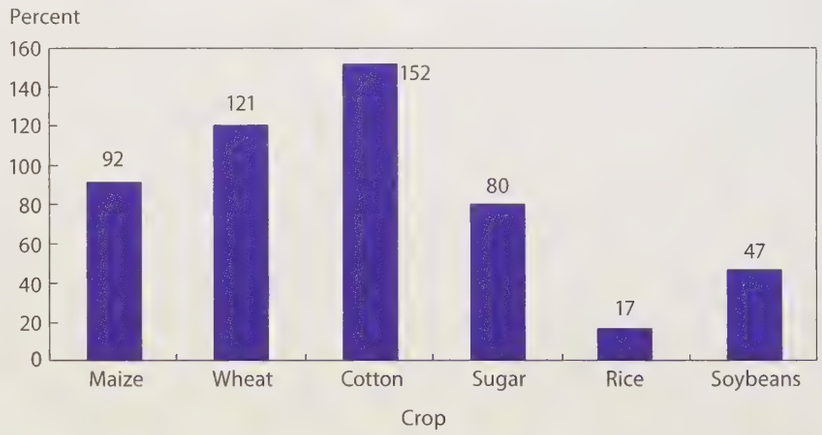

Fig. 2. Increase in agricultural commodity prices (June 2010 to Febuary 2011).
Source of raw data: www.indexmundi.com.

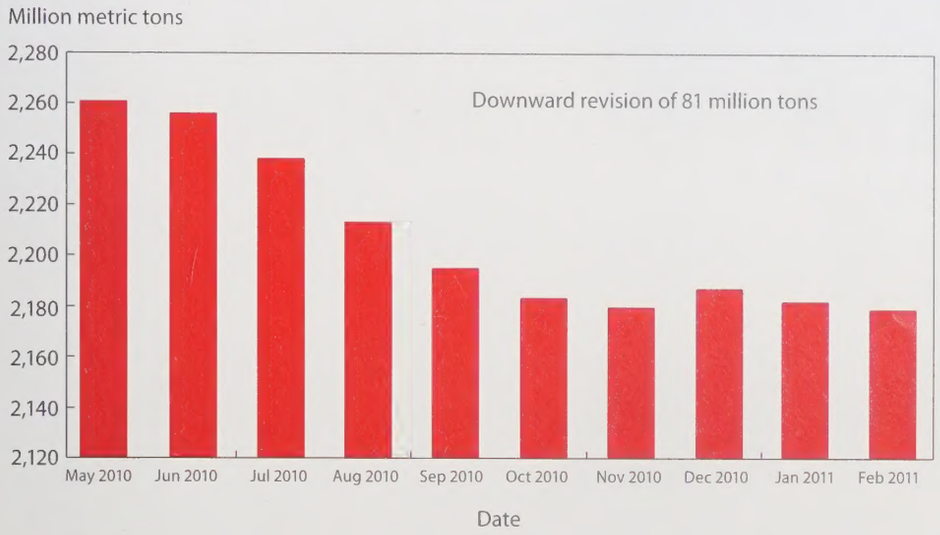

Fig. 3. Effects of inclement weather on 2010-11 grain production.
Data source: Various issues of World Agricultural Supply and Demand Estimates, USDA.

What lies ahead?

Recently, I was asked by a reporter if rice has done anything special since the 2008 crisis to be spared from the current price spike. The simple and plain answer is "no." In fact, the rice self-sufficiency goal pursued by many countries through trade restrictions has likely contributed to the market instability in the last few years. But, the good harvest of the past wet season has primarily kept the rice market stable during the ongoing food price turmoil.

The stability of the rice market, however, could easily be shaken by several factors. For one, the further tightening of the wheat market could eventually make the rice price tick upward. The ongoing drought in northern China could provide the necessary spark to fuel another round of grain price escalation. The continuation of the current drought for the next few months could also affect rice planting and, consequently, could push prices higher. Moreover, the disruption of the monsoon similar to the one witnessed on the Indian subcontinent in 2009 can also tip this delicately balanced rice market. In addition to weather uncertainty, higher prices for competing crops such as wheat, maize, soybeans, and cotton are also likely to influence farmers to switch from rice to these crops, putting pressure on rice prices to move higher. The current USDA estimates already point to a 20% decline in U.S. rice area this year to 1.15 million hectares although total field crop area is expected to be 4 million hectares greater than the 2010 level, that is, the highest level since 1998. In most rice-growing countries in Asia, such a massive shift from rice to other field crops is not expected, although some shift is possible. In many parts of Asia, rice is the only crop that can be grown in the monsoon season, leaving farmers no options to plant other high-priced crops.

Additionally, rising oil and fertilizer prices are likely to make things more difficult for farmers this year. As reported by the U.S. Energy Information Administration, the world crude oil price (all-country spot FOB[1] weighted by estimated export volume) exceeded US$100 per barrel by the end of February, nearly 46% costlier than what it was at the beginning of June 2010. Following the crude oil prices, fertilizer prices have also risen in recent months. The urea price (FOB Black Sea) increased more than 60% between June 2010 and January 2011. Higher fertilizer prices in the international market have started to trickle down to the retail prices in domestic markets. For example, the average urea price in the Philippines, as reported by the Bureau of Agricultural Statistics, increased by 18% from $21 to $25 (Php 920 to Php 1,086) per 50-kilogram sack between September 2010 and January 2011. A combination of lower rice prices and higher input prices may force farmers to scale back rice production by planting less area and/or applying less fertilizer.

Given the current situation of low rice prices and rising input prices, many governments in rice-growing countries are likely to take measures, including raising the level of the guaranteed producer price for rice and providing greater input subsidies to prevent rice production from falling through either lower area or lower yield.

Rising food prices are also likely to make many rice-consuming countries in the region feel jittery over the global food situation and may force governments to protect and reinforce the domestic supply by taking appropriate measures. This has already been evident in some countries. For example, the Myanmar government recently imposed a rice export ban to stabilize domestic rice prices. Similarly, Indonesia's more-than-expected purchase from Thailand in January and its plan to buy more rice in the coming months to boost its domestic stocks may be considered as a precursor to what other importers may also do if food prices continue to rise. Bangladesh has also already announced its intent to purchase more rice this year to curb the rising domestic price and rebuild its inventory. Although actions by Myanmar, Indonesia, and Bangladesh are unlikely to have much impact in the international arena, this definitely serves as a warning bell considering what happened in 2008 when major exporters imposed export bans that caused rice prices to explode. However, similar panic actions by other rice-consuming countries may tilt the market to an override mode and possibly cause a repeat of 2008.

A lesson learned

The rice sector has been fortunate to have escaped the wrath of the weather that affected many other field crops in the last several months. As discussed earlier, several emerging issues could shake this delicately balanced rice market within a short time. More importantly, panic among rice-growing countries as recently evidenced by the actions of Indonesia, Bangladesh, and Myanmar—if it spreads to other countries—could easily rattle this market. But, on the positive side, the comfortable supply situation in major exporters such as India, Thailand, and Vietnam should provide some cushion to the market. Ultimately, the weather in the coming months will be critical in deciding the fate of the market. Let's hope that northern China gets some much needed rain and the Asian monsoon comes on time, so that we will be well on our way to another stable year for rice.

[1] Free on board.

Breaking stereotypes

BY THELMA PARIS

The eighth day of March 2011 marked the 100th International Women's Day. This year's theme touched base with the call to provide women with "equal access to education, training and science, and technology." To celebrate this momentous occasion, the International Fund for Agricultural Development (IFAD), the Food and Agriculture Organization of the United Nations (FAO), and the International Labor Organization launched the publication of the study made by FAO in collaboration with IFAD and the World Food Program, titled "State of food and agriculture 2010-11: Women in agriculture—closing the gender gap for development." The report presented groundbreaking new data on the important roles that women play in agriculture and rural economies and the ways in which they are taking on greater responsibilities as farmers, food producers, and providers for their families.

In the context of agriculture and rural economies, rice farming is a major source of employment for many families, especially the poor. In fact, about four-fifths of global rice production is grown by small-scale farmers in low-income developing countries. And, quite significantly, rural women have traditionally played and continue to play an important role in both rice production and postharvest activities.

However, the crucial roles and the substantial support women provide to society have often not been recognized, much less appreciated. Social stereotypes have confined them in constricting environments that limit their growth and potential to contribute more to the development of their respective communities.

Education and training are key foundations of greater gender equality, and women's development and empowerment. As more women take on roles as farmers and heads of households, they urgently need access to technical training and opportunities to boost their ability to farm productively and run viable businesses. In South Asia and Africa, for example, most women have not gone to school and do not have access to the products of science and technology. Despite progress in bringing science and technology to millions of poor rice-farming families in stress-prone rice environments, many women farmers are still underrepresented in research activities such as on-farm experiments, farmers' field days, training, and dissemination. Moreover, women's exhausting domestic chores, such as collecting water and wood for fuel, divert their time away from farming tasks and nonfarm enterprises that eventually lead to low agricultural yields and food insecurity.

The International Rice Research Institute (IRRI), as a member of the Consultative Group on International Agricultural Research (CGIAR), has long advocated gender equality, in line with the CGIAR's mandate to reduce poverty and hunger and increase income through rice research for development. IRRI uses a three-pronged approach in tackling gender issues: (1) conduct strategic research on emerging gender issues in the rice economy, (2) include women in technology development and dissemination, and (3) enhance the leadership skills of Asian and African women in rice research, development, and extension.

IRRI's research on gender issues looks into women's and men's roles that are often conditioned by several interrelated socioeconomic (including class, ethnicity, age, marital status, and religion), cultural, political, and environmental factors. Changes in women's environment cause shifts in women's roles. For example, the increasing out-migration of men and the decreasing male-female ratio in agricultural labor tend to weaken the traditional divisions of labor in rice production, with women not only increasingly providing field labor for rice production but also taking on managerial and decision-making roles in rice farming.

A lack of comparable gender-disaggregated data in rice production, however, serves as a major constraint to gender research. Often, statistics reflect only the labor participation of casually-hired women laborers. The labor inputs of unpaid women are undercounted and undervalued in agricultural statistics; thus, these women are seldom referred to as rice producers, farmers, and income earners. So, IRRI developed a systematic collection of gender-disaggregated variables in base household surveys that provide the foundation for understanding the underlying patterns for labor participation that later on guide proposed interventions, training and extension strategies, and formulations of gender-responsive policies. In 2002, IRRI pioneered the *Leadership Course for Asian and African Women* that develops the leadership skills of women in agricultural research, development, and extension (see *The hand that rocks the thresher* on pages 26-27).

Moreover, despite women's visibility in fields and homesteads, scientists, agricultural engineers, and extension workers tend to consult only the men and they exclude women farmers in project activities in which women have an influence and in which their resources (time, indigenous knowledge, and labor) will be affected by newly introduced technologies. Hence, IRRI continues to push for projects that involve women's participation such as Stress-Tolerant Rice for Poor Farmers in Africa and South Asia (STRASA). IRRI's social scientists required that at least 30% of the farmers involved in participatory varietal selection be women.

Finally, more efforts will be poured into mainstreaming gender equality across the world through the Global Rice Science Partnership (GRiSP) that was launched last year. IRRI, in partnership with the Africa Rice Center and the International Center for Tropical Agriculture, has developed a gender strategy that will be integrated in GRiSP's mission to reduce poverty and hunger, improve human health and nutrition, reduce the environmental footprint of rice, and enhance ecosystem resilience of rice production systems through high-quality international research, partnership, and leadership.

Dr. Paris is an IRRI socioeconomist and gender specialist.

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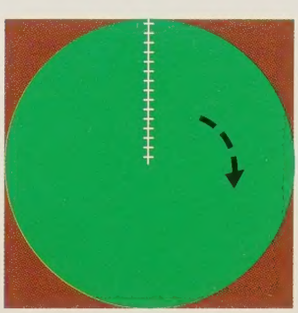

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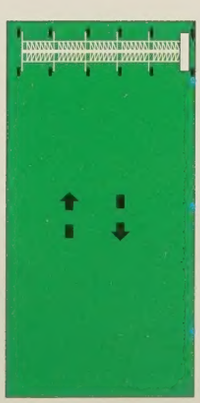

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